



European University Institute
Department of History and Civilisation

The Cornerstones of Modern Government
Maps, Weights and Measures and Census in Liberal Portugal
(19th century)

Rui Miguel Carvalhinho Branco

Thesis submitted for assessment with a view to obtaining the degree of
Doctor in History and Civilisation
from the European University Institute

Florence, August, 2005

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Editorial Norms and Abbreviations used

Orthography was updated, and punctuation kept.

All translations are my own.

AHIGP – Arquivo Histórico do Instituto Geográfico Português.

AHM – Arquivo Histórico Militar.

AHMOP – Arquivo Histórico do Ministério das Obras Públicas.

CCPM – Comissão Central de Pesos e Medidas.

CGT do Reino – Comissão Geodésica e Topográfica do Reino.

DCD – Diário da Câmara dos Deputados.

DGAC – Direcção-Geral da Administração Civil.

DGG – Depósito Geral da Guerra.

DGIP – Direcção-Geral de Instrução Pública (Ministério do Reino).

DGTGCH do Reino – Direcção-Geral dos Trabalhos Geodésicos, Corográficos e Hidrográficos do Reino.

DGTGCHG do Reino – Direcção-Geral dos Trabalhos Geodésicos, Corográficos, Hidrográficos e Geológicos do Reino.

DGTGEPM – Direcção-Geral dos Trabalhos Geográficos, Estatísticos e de Pesos e Medidas.

IAN/TT – Instituto dos Arquivos Nacionais/Torre do Tombo.

IG – Instituto Geográfico.

IGPM – Inspeção-Geral de Pesos e Medidas.

MOPCI – Ministério das Obras Públicas, Comércio e Indústria.

MR – Ministério do Reino.

RPM – Repartição de Pesos e Medidas.

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General Introduction

It cannot be denied that Cadastre, Topography, and Statistics, being a consequence of geodetic operations, are the cornerstones of the science of government; wherefrom we can deduce the knowledge of the facts, which is the foundation of true knowledge. Therefore, it is the strict obligation of a government that calls itself enlightened [...] to constantly promote said means of governance.

Filipe Folque, the leading nineteenth century Portuguese cartographer and head of the map-making Department from 1848 to 1874, authored the above quote in 1864.¹ Succinctly, it lines up my basic research issues. At a general level, my aim is to understand the consolidation of the modern state as a centre of political and administrative power. This topic can hardly be explored empirically as a whole. It is necessary to find historically situated «anchors» or «windows» from where to observe it. Traditionally, literature on historical state modernization focuses on war, taxes, recruitment and the political system – and Portuguese historiography is no exception. While these research topics are all plainly important, I chose differently. To observe an historical instance of state formation, I chose another set of inter-related issues: map-making, metrological reform and census-taking in Liberal Portugal. Looking closely at how such policies were put into practice, I seek to illuminate the nature and dynamics of historical Portuguese state development. On the other hand, the conclusions drawn from this particular case may be enlightening both for state formation processes generally and for how one should theoretically conceive them.

The questions I want to address are clear. What does one learn about the nature and development of nineteenth century Portuguese Liberal state from the way it carried out map-making, census-taking and metrological reform (all of which touch upon arguably core issues of historical state modernization: territory, people, and commercial exchanges)? With which resources, facing which resistances, employing which strategies, was the Portuguese state able to assert itself, and to improve its grip on the territory, the population, the economy and the day-to-day lives of the citizenry? Was it efficient at it, at modernizing? And, last but not least, what does «efficiency», what does «modernizing» mean? The present dissertation is an attempt to answer these questions.

Against the backdrop of European modernity and the long structuration of centralised administrative bureaucracies, I want to understand the machinery of the Portuguese state in the process of becoming modern. Geographical information policies were instrumental both for the historical transition from *Ancien Régime* to Liberalism, and for Liberalism itself. Due to their eminently territorial nature, such policies steer one's gaze to the centre-periphery perspective. Complementing a top-down with a bottom-up perspective, I am interested in the details, in the daily workings of the state, namely of those agents and agencies charged with the surveying of maps, the enforcement of the metric system and the execution of population censuses.

* * *

The Introductory Chapter will provide the dissertation's conceptual and thematic framework. Therein, I try to make sense of «modern statecraft». This process implied, amongst other things, that the state be transformed into the accumulation point of knowledge networks spread over its territory. These networks blanketed not only territory but also the people and things under the state's formal jurisdiction. In this respect, the efficiency of administrative power depended on the state's ability to

penetrate and interact directly with both population and territory through capillary networks of «knowledge/surveillance/administration», and to extract from them material and human resources (mostly taxes and recruits). Yes, but not only: also, map the country, enumerate the population, and homogenise the terms of exchange. One of the Introductory Chapter' central tenets is that via a process of mutual constitution, state and science are construed in a like manner, *technologically*. Therefore, it is useful to look at state formation with conceptual tools inspired by those used to look at the construction of techno-scientific systems.

Maps, weights and measures, and census, before and after 1851, provide me with the substantive structure of the dissertation. Part I, entitled «to become modern», deals broadly with the transition from late *Ancien Régime* to Portuguese Liberalism, up until the mid-century. The 1820 Liberal Revolution overthrew the former absolutist monarchy and installed a constitutional monarchy. Only after the liberal victory against the absolutist side in the 1832/34 civil war can we truly speak of a functioning state. Throughout the 1840's, state apparatuses were mainly concentrated in Lisbon and the government had not yet branched out into several ministries and general-departments. This was an epoch of preparation, discussion, polemics – rather than implementation. Chapter I looks at Portuguese cartographic policies between 1788 and 1852, from late *Ancien Régime* to the threshold of the «Regeneration» regime, already well into the Liberal period. Particularly, I will look at the transition between two different cartographic policies. The origin of the first, which I entitle «integrated topographic and cadastral survey», can be traced back to the 1788 decision to survey a General Map of the Kingdom. This was to have been a topographic map based upon geodetic surveys. The survey of a large-scale map dragged its feet until the late 1840's, when the project was coupled with that of the parcelled cadastre, only to be later dismissed. In 1852, a

new policy replaced the first one. This time, the General Map was to be of the chorographic kind, also with geodetic backing, but with no parcelled cadastre «underneath». My main analytical purpose is to shed new light on the demise of the first policy and on the process that led to the definition and later adoption of the second, focusing on developments in the field of taxation, between 1848 and 1852. Herein, I argue that the replacement of the policy followed thus far had to do with a new balance between the scientific, military and civilian components of the geographic information model, in the face of which the map-making department reordered its set of strategic relations.

In Chapter 1, being the first chapter of narration, the reader will be provided with footnotes, apart the chapter's endnotes, offering general historical background on Portuguese history of a mainly political nature. Such footnotes serve the purpose of contextualizing the narrative, while getting the non-Portuguese reader acquainted with major historical events and conjunctures. Additionally, the reader may find it useful to consult the Historical Timeline, provided in the Annex.

Chapter II is devoted to metrological reform, from 1814 to 1851. Research in this chapter inevitably begins by focusing on the French historical case. It is important to understand the French case because of its exemplarity: in Portugal, both reformist and non-reformist sides, in support of or against the introduction of the metre, appropriated the French «example», oftentimes under the form of ready-made historical *vulgata*. Next, I review the work of various committees appointed since the early 1810's to propose a new and more adequate system of weights and measures. Some of the first memoirs on the need to reform the old system by adopting the metric one go as far back as 1814, which draws attention to another question. In fact, this reform had already been wanted in the later *Ancien Régime*, being part and parcel of a wind of enlightened

reform which swept from judiciary structures to map-making. The issue passed on to the Liberal period. The four decades between 1814 and 1852 were a period of nearly continuous discussion of metrological reform. Committees were appointed, reports were filed, and legislation prepared up until 1851. In practice, nothing happened. To the minds of politicians, the peasant rebellion of 1846 and the civil war of 1847 warranted concerns of popular uprisings should the metric system pass into law in its full-fledged form. Thus, in both Houses of Parliament, endless committees discussed back and forth different versions of the reform bill. As one of the senior and most shrewd politicians, Rodrigo da Fonseca, put it back then, «practice» – that is prudence – «is the beacon that must guide legislators in all matters administrative». This chapter will show that liberal reformers, even if they conceived of the people as objects for perennial reform, and of themselves as their new self-appointed maker, still did not look at them as a revolutionary would, as a *tabula rasa*. There were acknowledged limitations: embedded custom and the recent memory of social upheaval. And, one should add, a miniscule, poor, and understaffed state.

Concerning weights and measures, the pros and cons, legislative options, and attendant political liabilities bore, in 1848, resemblance to those of 1820. It seems the state administration itself was unable to take to practice a reform that had been exhaustively discussed, prepared, and planned. The political *status quo* unleashed by the Liberal Revolution and the resulting disarticulation of the state apparatus prevented the implementation of nearly any reform plan. The ensuing instability, three decades of continuous «cold», and often not so cold, civil war, jeopardized everything, or almost everything, that had once been attained. Parliamentary discussions about the adoption of a new and uniform system, heard on the Lower House's floor during the 1840's, made it plain the whole process had gone back to scratch. The breakdown of central

administration should not be singled out as the sole and major cause for the failure to reform. One should not forget the resistances put forward by various social groups, namely those represented by the new power elite.²

Part II of the dissertation deals with the state at work, looking closely at its moving parts. The historical turning point was unquestionably 1851, the year of the «Regeneration» coup. The «Regeneration» regime inaugurated an era of stability. Broadly speaking, the state grew and expanded; policies began to be enforced; new forms of resistance emerged. A number of projects and ideas, some of which coming from the late *Ancien Régime*, met their practical application. This was when the rubber met the road. In the thirty years from 1851 to 1880, the first and secondary-order geodetic networks were surveyed; most of the chorographic map at the scale 1/100 000 was surveyed and printed; the geographic map at the scale 1/500 000 was surveyed and published; the topographic chart of Lisbon at the scale 1/1 000 was surveyed and published; the metre, the kilogram and the litre were enforced (which is not tantamount to being in general usage); and the 1864 and 1878 censuses were taken and published. How to interpret this seeming accretion of state infrastructural power? That is the task to which the three following chapters are devoted.

The overall aim of Chapter III is to closely examine the mutual constitution of state and science as they come together in the production of maps. The making of map and state alike requires both resources and the ability to hold them together, carefully *networking* them in such a way that they become capable of resisting the forces working to break them apart. This chapter shows the way in which fieldwork is associated with the larger design of map policies; how the implementation of a particular cartographic «programme» is both a constraining and an enabling structure; and how the codification of applied science goes hand in hand with fieldwork's trial and error. Only by travelling

the analytical road between macro and micro can one hope to grasp the set of mutual adjustments and reactions implied in setting up a bureaucracy and producing a map. Therefore, being the study of how map policies are put to practice, of how surveying gets done, this chapter is also a history of the «heterogeneous engineering» by which Portuguese state and *Carta Chorographica* alike were made to endure. In order to fabricate maps, one needs well-trained men to do the survey; monies, regular and adequate, to pay them on time and, say, buy instruments; authoritative power, stemming from law to, for instance, «help» cross the country uninjured and legitimately enter private houses and domains; a legal framework prioritising the kind of maps to be surveyed; bureaucracies to organize different tasks; skills and technical knowledge; instruments; printing facilities, and so on.

The aspects I just enumerated are the chapter's objects of enquiry. First, a demonstration of the nature of cartography's new set of strategic relations and a follow-up on the concrete execution of the policy embodied by the *Carta Chorographica* itself. The *Carta* was designed to prop the «Regeneration» regime's vast programme of material improvements. We shall see that such a model contained important contradictions and limitations, which eventually brought about its own exhaustion, plainly apparent by the end of the century. Second, I examine the institutional framework within which map-making was carried out, to wit: legislation, monies, personnel and codification. Third, a magnified look at the agency of engineers in fieldwork will reveal the assorted range of activities they were engaged in, the resistances they faced and the strategies employed to overcome them.

In 1852, some of the concerns that had worried politicians so before the «Regeneration» coup seemed to be absent from the government's mind. So much so that the government passed a radical version of the metric reform bill, adopting both metric

system and nomenclature; an outlook considered completely alien to Portuguese mores. Probably, after 1848, the defeat everywhere in Europe of the revolutionary hydra lent the Portuguese government the confidence it had lacked before. The frantic waving of the «*Maria da Fonte*» as a scarecrow, a useful rhetoric device in parliament just a few years earlier, had by now lost its fearsome quality. Also, the fact that Fontes Pereira de Melo, who had been one of the most strenuous defenders of metric's integrity, had become minister of the Interior in the «Regeneration» cabinet was certainly not devoid of consequence. Chapter IV studies the decision to adopt the metric system, the state department set up to see through its implementation, and the enforcement process proper.

More than told, or compelled by penal articles of the law, people had to be convinced of the wonders of the metre. Top officials were acutely aware of this, and accordingly designed the enforcement strategy. Apparently, commoners resisted using the new system, in the same way they destroyed geodetic signs, assaulted officers in fieldwork and set land registries on fire. To acknowledge these «active» forms of resistance should not obscure the importance of «passive» forms, the latter being as, if not more, «resistant» as the former.³ As in the days before the «Regeneration», it was still hard to tell the voice of prudence from that of resistance. It took a very long time, and a considerable amount of resources, until the «metric» became something «natural». In this Chapter, I seek to understand this slow process of «acceptance».

Chapter V focuses on the 1864 general population census, and might be described as a case-study in which the comparison is drawn diachronically rather than synchronically. But what is it that is being compared? The aim of the chapter is to inquire as to how the 1864 census was carried out and gauge whether it lived up to its epithet: the «first modern census». Firstly, this will entail an understanding of the

relation between official statistics and state formation, in general, and between census-taking and the Portuguese Liberal state, in particular. In order to assess how, and for which purposes, the Portuguese state counted people up until 1864, I will look at the annual censuses carried out by the Ministry of the Interior and at the harsh criticism targeted at them. Next, the chapter looks back at the initial stages of the general census design, stressing how important the recommendations of the International Statistical Congress were. To conclude, the results and findings of the census are assessed from the viewpoint of how well the process went and how trustworthy the findings were.

The census provides a fruitful standpoint from which to appreciate the interaction between peripheral administration, municipalities and Church, all co-involved in collecting information on the population. The Church controlled the parochial registries, which fed municipal administrators with information they themselves forwarded to prefects, and then on to the Interior. The unearthing of population data is crucially linked to military recruitment, the apportioning of taxes and the drawing of electoral constituencies. It could hardly touch upon more central issues in the social power dynamics of local communities. The 1864 census was, as every «modern» census, designed to rid information gathering of deforming local «passions», officials' corruption and widespread sloppiness, and to insulate the whole enterprise from the ecclesiastic administration. That is what «modern» really meant. In 1864, collaborative efforts with priests and the Church in general were pretty much deliberately set aside. Not surprisingly, with little dismay of top officials and also, it was found when results were published, to little avail. The Statistics Department itself admitted that much: the cry of independence did not serve the census well. So much so, that the next census, in 1878, got priests and the Church back on the wagon. From the viewpoint of the consolidation of an insulated weberian-like statistics department, the

1878 census represents, in many and important ways, a setback. However, one should be mindful that «setback» is just one way of describing it; another would be «learning process» begetting «increased efficiency». Is the story of both censuses the confirmation of a laggard state shot through with archaisms or does it signal a realistic capacity to negotiate with local, *de facto* powers, in that being typical of the Janus-faced nineteenth century Portuguese state? This is a question whose answer brings us already well into the Conclusion and to a reappraisal of the topics outlined in the Introductory Chapter.

Notes

¹ Filipe Folque, *Projecto de organização permanente da actual Direcção Geral dos Trabalhos Geodesicos, Chorographicos e Hydrographicos do Reino*, ms., 5-9-1864, AHIPCC.

² David Justino, *A Formação do Espaço Económico Nacional. Portugal 1810-1913*, vol. II, Lisbon, Vega, 1989, p. 197.

³ Justino, *A Formação...*, op. cit., 1989, pp. 200-201.

Introductory Chapter

*Etre gouverné, c'est être, à chaque opération, à
chaque transaction, à chaque mouvement, noté,
enregistré, recensé, tarifé, timbré, toisé, coté,
cotisé, patenté, licencié, autorisé, apostillé,
admonesté, empêché, réformé, redressé, corrigé...*

Pierre-Joseph Proudhon¹

A. Concepts

Modern Statecraft

Firstly, there is the concept of «state». Herein, I take my lead from Michael Mann in adopting an operative definition of the state which pays due tribute to Weber.² I analytically define the state as a differentiated set of institutions and personnel, embodying centrality, in the sense that political relations radiate outwards from a centre to cover a territorially demarcated area, over which it exercises a monopoly of authoritative rule-making, backed up by a monopoly of the means of legitimate physical violence.³ From this viewpoint, state power springs from its territorial and spatial nature; its autonomy *vis-à-vis* other sources of social power derives from the fact that the state monopolizes authoritative rule-making inside a given territory while there are a number of social functions that can only be performed with maximum efficiency at a territorially centralized level: functions such as the maintenance of internal order, military defence or aggression, the setting up of a communicational infrastructure, and economic redistribution. Mann also distinguishes between the historically declining despotic power and the ascending infrastructural power of the state, defined as «the capacity of the state actually to penetrate civil society, and to implement logistically decisions throughout the realm», the latter being typical of modern nation-states.⁴

Giddens adds to this view his notion of the state as «power container», meaning a circumscribed social arena specialized in the re-production of administrative power, which is a power composed of allocative and authoritative resources.⁵ The author argues that surveillance practices are essential to the accretion of power resources in a territorially confined unity, the state. State bureaucracy gathers coded information that can be used to monitor the activities of those about whom it was collected or to directly supervise the activities of others by those in authoritative positions. The ability to exercise a remote, impersonal and efficient surveillance of people and «things» under its jurisdiction distinguishes the modern state from other historical forms of the state.⁶

Under feudalism, the institutional forms of government and economy coincided. The manor or the village provided the basis for the economy *and* the polity, which were dominated by the nobility, particularly in what concerned military and excise issues. In practice, real government was decentralized and operated on a daily basis by the nobility, and not by the «state». The state, little more than a far away ruler in his household, had mere nominal political power, since *de facto* power dwelt in the hands of the landed nobility. The anatomy of feudal relations and the extreme weakness of the communicative-penetrative capacity of the state explain such a state of affairs. Political power was parcelled.⁷ Hintze has aptly described this situation: «Domestically, the principle obtained of *chaque seigneur souverain dans sa seigneurie*: the state's power was not yet concentrated in one point but was still dispersed among various centres and effective at the top only in a highly diluted form».⁸ The territory was segmented, with little connection between the fractions; economic power and political power were decentralized. The dominant nobility had its hands in the institutions of government at the local level, amounting to decentralized, centrifugal terms of rule – what Tilly calls «indirect government».⁹

The process of state formation is the process of accreting political power by penetrating the society and the territory. In order to do so, states aimed to interact directly with the people, by way of counting, measuring, taxing, arresting, and conscripting them. In the modern state, the power dwells at the central level, the terms of rule are centripetal and the mode of government is direct. How did this come about? How did the complex of feudal relations evolve and change?

A more disputed question is hard to come by. One of the historiographical answers has been to underline the thrust of change triggered by an evolution in the military sphere, the so-called military revolution.¹⁰ This revolution brought profound changes to warfare (the phalanx, gunpowder, firearms and canons entered the battlefield), and had a major impact upon state formation processes. In particular, the new warfare technology required a dependable collective discipline and standing army, and brought on a decline in importance of the cavalry and private armies put together by noble lords. Thus, not only was the king's dependence on the nobles (who often turned up on the wrong side of the battleground) attenuated to a great extent, but, more importantly, the standing army could be used, as it was, to «pacify» those same nobles into obedience.

In order to finance continuous warfare the state enforced a fiscal monopoly, confronting the power base of the nobility. Hintze tells us that «preparation for war became a financial question, and after the fourteenth and fifteenth centuries we find the rulers striving to extract payment rather than military service from their vassals and other subjects in order to prepare themselves for war. This became a prime cause for the development – or at least the more frequent convocation – of assemblies of the Estates, Parliaments [...] The feudal system with its numerous insulated centres of authority was

displaced by the system of Estates, with the uniting of the Estates in corporative bodies for common participation in the affairs of the province or the state». ¹¹

Slowly and unevenly, the state came to be institutionally detached from society in the fiscal sphere, mainly by the setting up of an insulated fiscal bureaucracy which replaced, step by step, the nobility as the most important *de facto* governing and tax-collecting organization. Nonetheless, only in the absolutist period did taxation become fiscal in the modern sense of the word, that is, it became a result of the differentiation of a public domain of finance and expenditure from the private economy of the ruler's household. In many ways, it is the very development of the modern fiscal state that makes real a centralized and impersonal sovereignty, isolating the political and economical realms. The parcelled territory of the traditional state thus came to be integrated via state-led development of communication infrastructures (roads, railways, telegraphs, and literacy), fiscal strategies (v. g. mercantilism), bureaucratic apparatuses, the rule of law, and the homogenisation of weights and measures, time and currency. ¹²

As Elias points out, strategies of «internal pacification» were instrumental to state formation to the extent that they enabled the ruler to neutralize his major internal rivals. ¹³ The historical process of internal pacification had several different instances: the creation of a standing army oriented towards external defence; the creation of a separate police force oriented towards internal security; fiscal and administrative monopolies; and the courtization of nobility. The court brought the nobles closer to the king, rendering them visible to the ruler and to each other, short-circuiting their main advantage, geographical distance. By displacing the nobles from the periphery to the court in the centre, the king was able to keep them under close surveillance. Courtly etiquette games entangled the nobility in heavy financial obligations. The «court society», as a political strategy, enabled the ruler to redefine power relations within

society, repositioning himself *vis-à-vis* the nobility, simultaneously displacing the nobility from a position of local autonomy to one of central dependence (*ipso facto* reversing the terms of rule).¹⁴ The setting up of a bureaucracy also contributed to this outcome, in two main ways: it gave the centre an independent (from local *de facto* powers) channel of communication-knowledge-administration, and, via the selling of public offices, provided the ruler with a means of co-opting the nobility. The dispensation of offices to the nobility and aristocracy, often desperately in need of stable income, turned out to be a very effective way of securing their allegiance.

In addressing the relation between administrative power and internal pacification, Giddens isolated as specifically «modern» the emergence of institutions devoted to the surveillance and policing of the population's routine activities. These were specialized agencies, separate from the body of the armed forces.¹⁵ There is no reason to limit the definition of such agencies to the police or any other law-enforcing institution. Actually, it would be better to speak of the «*étatisation des mécanismes de discipline*», in other words, of the co-extension of disciplinary mechanisms to the capillary network of the state.¹⁶ The centralized storage of information pertaining to the administrative realm, as a basic mechanism for accumulating power, is precisely *what* characterizes cartographic, metrological and statistical operations.

Michel Foucault provides in *Surveiller et Punir* an interpretative model I think is worth exploring. My hypothesis is that maps and censuses should be interpreted as panoptical mechanisms for the surveillance of population and territory. According to this view, these practices are revealed in the form of power-knowledge, profoundly connected with the panoptic mode of surveillance typical of the «disciplinary society».¹⁷ Foucault compares two models of the «political economy of the body», that of plague and that of leprosy. He sees in the dispositions adopted to fight the plague the

crystallisation of a social control model he labels «disciplinary society». It is a model in which:

«[L]es individus sont insérés en une place fixe, où les moindres mouvements sont contrôlés, où un travail ininterrompu d'écriture relie le centre et la périphérie, où le pouvoir s'exerce sans partage, selon une figure hiérarchique continue, où chaque individu est constamment repéré, examiné et distribué [...] A la peste répond l'ordre [...] Contre la peste qu'est mélange, la discipline fait valoir son pouvoir qu'est d'analyse».¹⁸

In the rationale of Bentham's *Panopticon* – ideal-type of the disciplinary technology of power – one can find a similar concern with the individualised observation, with the analytical disposition of the space; one can observe the operation of the same kind of power, invisible and unverifiable, and the same differential relation of power between the observer (always invisible) and the observed (always *made* visible) as in the census and the map.¹⁹ Thanks to panoptic observation mechanisms, «le pouvoir gagne en efficacité et en capacité de pénétration dans le comportement des hommes; un accroissement de savoir vient s'établir sur toutes les avancées du pouvoir, et découvre des objets à connaître sur toutes les surfaces où celui-ci vient s'exercer».²⁰

Nevertheless, the invisibility of panoptical surveillance mechanisms does not result in a frictionless exercise of power, devoid of any social conflict. Or rather, new vehicles of control correspond to new objects of protest. If one considers a peasant rebellion directed against a tax increase as a classic type of conflict, the reaction against the metric system seems more like a civil rumour: scattered, apparently meaningless, almost anomic. The «new» protest combines the struggle against well-established and visible objects with essentially new forms resulting from a diffuse understanding of (also new) control mechanisms. I refer to the destruction of measuring standards, as well as to the trashing of conscription registries, demolition of geodetic signs, and

burning of land registries, all around Portugal in the 1860's. «Incomprehensible», «barbaric», the civil rumour draws our attention to the subtleties of panopticism.

One can also perceive a transition in the mode of bureaucratic surveillance practices, from a direct mode of control of the personal or patronage type to an indirect mode embodied in impersonal bureaucratic systems in which the individual is the subject of a permanent «travail d'écriture».²¹ According to Dandeker's ideal typical interpretation, bureaucratic surveillance came to be a practice executed by a permanent, rationally disciplined body of personnel operating inside a tight administrative network. Even if, on the whole, this perspective captures a grain of truth, it should be qualified: weberian pessimism and foucaultian inspiration should not concur into an interpretation in which all power is all-powerful and in which the individual is either trapped in an iron cage or stripped of his agency. Furthermore, what is at stake is not simply the concentration of administrative power in the centre, as Dandeker one-sidedly stresses. In fact, the centralization of strategic power and authoritative rule making is coupled with the decentralisation of specific authorities (or tactical powers) to operational departments or agencies *in the field*.²²

A critique

The literature on state-formation I have been reviewing, namely authors such as John Hall, Charles Tilly and Christopher Dandeker, tends to portray that historical process as a transition to modernity.²³ As we have seen in greater detail above, this usually means a transition between two ideal typical modes of social control: from direct forms, based upon interpersonal or patronage type of social relations, to indirect forms supported by administrative and scientific bureaucracies located at the centre of political power. In my opinion, this reasoning ought to open some analytical space to stress the complex

intermingling of continuities and discontinuities in between the two moments. To be useful, analytical categories ought to shed more light than shadow. If one wants to keep on applying to states and administrative practices such categories as «modern» and «traditional» one has to, on the one hand, remember that they are ideal types, hence not expected to be found in historical reality as such, and, on the other, to admit that the presence in «modern» states of features belonging to the «traditional» type, such as patronage and different kinds of negotiation, are of the very nature of such states, rather than anomalies to be discarded.²⁴ A good example of such a hybrid feature was the Portuguese state's use of the parochial network to conduct population censuses, at least until 1864.

Given their weberian root, these perspectives are often ill-equipped to deal with resistance to state «infrastructural penetration» and with the attending consequences in the way state power was exercised. That is, they tend to look at caciquism, patron-client relations, and «contractualisation» with the Church as archaic traits of a country laggard in «modernisation», as a sort of detour in the road to the ideal-type of rational, insulated bureaucracy. Weiss and Hobson have tried their way around the problem by fine-tuning the concept of infrastructural power into three analytical dimensions: (i) penetrative power, the state's ability to reach into and directly interact with the population and the territory; (ii) extractive power, the state's capacity to extract material and human resources from society, whether for the purposes of taxation, warfare or welfare; (iii) the ability to negotiate, that is, the state's availability to engage in transactions with major power-actors (individual or groups) within a society, implying some measure of reciprocity.²⁵ The latter has the advantage of turning what was deemed a shortcoming into an inbuilt characteristic of state power, while acknowledging a very common

empirical finding. However, one is left with the impression that inability to enforce political decisions reads as a sign of might.

An argument

As a number of authors has shown, European states expanded and specialised enormously from the eighteenth century onwards. The state kept adding more and more tasks to regulate, protect, and oversee. The enlargement of the state's reach was particularly prominent in the civilian scope.²⁶ I want to clarify my understanding of this expansion in nineteenth century Portugal and subsequently of what I believe is the best way to research this expansion.

In the nineteenth century, the Portuguese state grew bigger. Portuguese scholarship has, of course, pointed out this growth.²⁷ Not surprisingly, this historical fact has been variously interpreted. State expansion was couched in the expansion of administrative apparatus, readily visible in the increasing specialisation of administration itself: new ministries, internal differentiation within existing ministries, and a dramatic increase in personnel.²⁸ Other instances of this expansion were the rise in fiscal revenues and the kilometres of roads and railways built.²⁹ Nevertheless, this growth was seen as a purely quantitative phenomenon, as would be shown by the low efficiency of the state, be it in tax-collection or conscription. In fact, the state's difficulty in insulating the enforcement of policies with a territorial or fiscal incidence from external influences, either local or corporate, has been pointed out.³⁰ Hence, scholars have taken sides: either they have portrayed the state simply as weak, if not pathetic – especially when compared with other European states³¹ –, or been inclined to give a rosy image of state expansion, which would be particularly noticeable in the

realm of roads, railways, telegraph lines, harbours, juridical codification and in the sheer increase in the administration's size.³²

More recently, as a result of more specialised, monographic researches a third line of interpretation has come up, one with which I identify myself. These are scholars who have been working in the areas of electoral history and caciquism³³, administrative elites and bureaucratic history³⁴, municipal and administrative history³⁵ and fiscal history.³⁶ My master's dissertation was an attempt to extend this approach to the realm of cartographic policies.³⁷ This interpretation holds that it is as important to acknowledge the (quantitative and qualitative) augmentation in state capacity, as to describe, and *qualify*, that increase. Even though we may assert that the state grows «bigger», increasingly penetrating the territory and the lives of the citizenry, it does so *through a negotiation process, in a non-linear way*. Furthermore, attention has also been brought to the mediating functions of «middle men» or policy-brokers in the machinery of the peripheral administration.³⁸ As convenient shorthand, I label this approach *transactional paradigm*.

In my view, this transactional growth should be linked with the evolving structural patterns of Portuguese society. The difficulties faced by nineteenth century liberal governments in enforcing political decisions throughout the realm seemed to result from the need to make a shift concerning the social groups with which the state contracted (*latu sensu*). If the central government could not or would not do away with intermediary groups, contractualized enforcement was put to work and delivered a modicum of efficiency – not optimal, of course, but some, nonetheless.

The need to cooperate and negotiate, both at central and local levels, clearly pointed out in Weiss and Hobson's model, gave rise, however, to inefficiency and resistance, thus retroacting over the state's overall infrastructural capacities. These

intermediary groups (say, the Church or seigniorial proprietors), caught up in a process that extinguished their functional role, relied on the peripheral administration for their social power trade-off (and *not* on the central administration, found to be relatively insulated from such pressures³⁹). As Oliveira Martins once put it, Liberalism transformed «the landed cacique into the bureaucratic cacique». The more efficient the articulation between the centre and the periphery, the more the state could do without negotiating with those local *de facto* powers upon which that articulation had been based in the past. The functional role which once had elected these groups as relevant negotiating partners was slowly evaporating. That is probably why they resisted.

State formation and science making: an alternative framework

It is my contention that by changing the way one understands the workings of the state one can hope to overcome the shortcomings of the body of literature I just reviewed. Simply put: one ought to look into the day-to-day workings of state machinery. Such a stance has obvious consequences, notably in the selection of sources and in research design, requiring a journey from overtly macro and central viewpoints to micro and local ones⁴⁰; moreover, one should allow the input gathered from the latter to inform one's views on the former and on theoretical issues such as the controversial understanding of «historical state modernization». The following section is an attempt at providing such a framework.

Traditionally, the historian of cartography, as in general any other historian, could occupy himself with two distinct research programmes, two distinct lists.⁴¹ On the one hand, the «history and politics» list, featuring easily reified historiographical objects such as the state, politics, policies, parties and institutions, bureaucracy and individuals. On the other, the «science» list, comprised of techniques and technology: instruments,

mathematics, geometry, and projection, to name but a few. The first would be concerned with human agency, the field of «the Social», while the second would deal with the «Book of Nature». The first would correspond to an externalist approach, the latter to an internalist approach to the history of science and technology.

In fact, looking at these aspects as being radically different or dissociated is misleading.⁴² To the contrary, following the suggestions of John Law and Bruno Latour, I will consider them to be elements of a network of entities («actants» in the actor-network terminology) held together by means of «heterogeneous engineering».⁴³ For my current purposes, I shall re-describe map-making as the ensemble of social competences and engineering skills required to hold together a broad spectrum of entities in producing a stable technological system (in this case, geodetically based large-scale maps). Technology is the centripetal force keeping together a range of elements traditionally classified under the labels: the social, the political, the technological, the human, the natural, or the narrative.⁴⁴ «Map-making» is the end-result of these social processes and «cartography» the field of knowledge produced thereof.

What does «heterogeneous» mean in the expression heterogeneous engineering? Engineers went out to fieldwork loaded with instruments: theodolites, thermometers, barometers, compasses, pencils, drawing materials, and so on. Yes, but not only. Fieldwork campaigns were also made of the careful deployment of Royal Engineering Corps' privates, local handymen, bricklayers, horses and mules, tents, bread and other supplies, medicines and drinking water. These are the «allies», constitutive actants of a technological network. Officers in fieldwork had to solve the problem of «how to juxtapose and relate heterogeneous elements together such that they stay in place and are not dissociated by other actors in the environment in the course of the inevitable struggles, whether these be social or physical or a mix of the two».⁴⁵ Engineers tried to

enduringly associate heterogeneous elements with identities and mutual relations which were problematic and not settled once and for all. Michel Callon has coined the concept of «actor-network» to convey the ensemble of elements in a technological network and to describe the mechanisms governing their transformation and consolidation.⁴⁶

As we shall see, engineers in fieldwork measure angular distances, take bearings, calculate azimuths, build pyramids, and solve endless triangulations. The products of their labour are inscriptions: figures produced by means of instrument-reading or secondary calculus.⁴⁷ For inscriptions to be useful, they have to travel to an accumulation point («centre of calculation») where they will become a different object altogether, the easily recognizable map. In order to travel, inscriptions have to display a number of constitutive features: mobility or the ability to move back and forth across the network; immutability or the ability to travel without distortion; and ductility or the ability to be accumulated, aggregated and recombined in any way or onto any surface like a pack of cards.⁴⁸ To «mobilize the world», to map the kingdom, refers precisely to this transformation of «real things out there» into «inscriptions».

What makes a network long-lasting? Law submits that *«the stability and form of artefacts should be seen as a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network»*.⁴⁹ The construction's success can be assessed by the longevity of the heterogeneous associations or their ability to resist centrifugal forces working to dissociate its components.⁵⁰ Diseases, destruction of pyramids, assaults, irregular funding, and imperfect instruments are some of the forces that seek to dissociate the precariously woven entities.

The working of cycles of accumulation and the redistribution of the knowledge and power they produce are crucial in the case of geodetic map-making – but also of state building. The first time the engineer goes out to the terrain to survey its topography

he cannot assert he knows the terrain because the terrain is not yet familiar to him. Familiarity comes only with a second pass. At first contact, the engineer will always be weaker (in Law's sense) than the terrain ahead. This unbalance of power is about to change. However, to effect this change, it is necessary for someone, somehow, to have found a way of bringing the terrain back to Lisbon, the centre of calculation. That was what happened when that same portion of terrain was reconnoitred and subsequently surveyed for primary and secondary triangulations some years before the topographer ever set foot on it. When he did, he carried with him the *croquis* and the various-order geodetic surveys drawn up beforehand by his fellow predecessors.

That tiny difference is decisive in broadening the gap between the engineer's knowledge and the knowledge any peasant might have about the same terrain. Therefore, I suggest looking at cartography («the objective knowledge of the terrain») not as something that can be described in reference to itself or by opposition to ignorance or faith, but as a knowledge constituted through this *cumulative cycle*. The centre and point of accumulation of the cycle is located in the Geodetic Depot in Lisbon; the peripheries, the terrain to be known, being its arcs of circumference. It is a cycle because every fieldwork campaign a set of engineers leaves headquarters and goes out equipped with instruments to record the features of the terrain. The turn of the cycle is completed at the end of every campaign with the return of engineers, their instruments, and the inscriptions they have collected.

But what does bringing back the terrain mean, and how is it accomplished? The transformation of «height» into «altitude» results from a change in the frame of reference which allows it to escape locality. A mountain's peak ceases to be a geophysical reality, and is translated into a set of inscriptions or instrument readings: altitude, latitude, and longitude. Spherical trigonometry and cosmography «make sense»

of inscriptions; the reliability of readings is warranted by the mathematical theory of error, statistics. But this is not all. As we shall see from following engineers to fieldwork, a set of other elements must also be aligned to effect a successful fieldwork campaign, such as: regular funding, the ability to contract local manpower, success in negotiating with local landowners and administrative authorities, the ability to evade diseases and physical aggressions, and so on.

At the end of every fieldwork campaign, the information gathered in the centre broadens the asymmetry between those in the centre and those remaining in the periphery. The cumulative cycle enables a certain point to become a centre, acting at a distance over other points.⁵¹ On the other hand, the uneven distribution of information along the points of the network creates a hierarchy of information, but, of course, also of power. It is an instance of the process of mutual constitution of knowledge and power described by Foucault.⁵² Inscriptions and the cumulative cycle help to tip the power/knowledge scales in favour of the centre. Those in the centre become stronger than those in the periphery.

It is important to keep in mind the negotiable and malleable status of the entities comprising the network. Callon suggests that heterogeneous networks (the «actor-network» in his terminology) should not «be confused with a network linking in some predictable fashion elements that are perfectly well defined and stable, for the entities it is composed of, whether natural or social, could at any moment redefine their identity and mutual relationships in some new way and bring new elements into the network».⁵³ This is a crucial contention. If one conceives the emergence of power/knowledge regions as a consequence of the working of the cycle, then one has to admit that the statuses of those areas are neither settled *beforehand*, nor *once and for all*. Due to their historical structuration⁵⁴ and functional dynamics both geodetic and administrative

networks transform certain areas into central regions and others into peripheral ones. It is advantageous to consider the categories «centre» and «periphery» as results of this process, rather than *a priori* constructs.⁵⁵ At the end of each fieldwork cycle, the broadening of the asymmetry implies that those who remain in the periphery are made local and those who remain in the centre are made central. In connection to this, one can look at the claim to universality characterizing both scientific knowledge and Bourdieu's «*capital étatique*» as being the local knowledge produced in the centre.⁵⁶

The centre/periphery morphology should be understood as a power/knowledge result of the network's operation because the very dynamics of the cumulative cycle produce, broaden and reproduce knowledge asymmetries across its constitutive points. The same dynamics allow a point to act at a distance over other points. In my view, there is no reason to confine these relationships to science and technology. The regime which governs the relation between the centre of calculation and the terrain is similar to the one governing the relation between the state and the people, things and territory. Seen from this perspective, there is little difference between making science and the making of the state.

The effects I mentioned above can be described as government effects⁵⁷, in the more limited sense of administration of the *res publica*, or governmentality, in the wider sense of: «the ensemble formed by the institutions, procedures, analyses and reflections, the calculations and tactics that allow the exercise of this very specific albeit complex form of power, which has its target population, as its principal form of knowledge political economy, and as its essential technical means apparatuses of security.»⁵⁸ Governmentality is not exclusive of governments; it is incorporated in all efforts to govern the wealth, health and happiness of populations.⁵⁹ It is structured around cycles of social control linking observation with normalizing judgement and regulation. In

particular, observation techniques provide a way to compare reality to the norm, but also allow government authorities to decide whether there are limits to their capacity to implement the norm and whether it is necessary to rectify those deviations.⁶⁰

As an incarnation of power, governmentality permeates the relationship of administrative sovereignty between the state and the citizenry.⁶¹ In order to capture this idea, Rose and Miller have put forward the concept of «technologies of government». These are heterogeneous mechanisms (in Law's sense) through which political rationalities and the programs of government which articulate them become capable of deployment.⁶² These technologies modify the capacities of agents and of organizations, and change the power relations they shape and in which they are embedded.⁶³ However, the authors stress, it is not a matter of implementation of ideal schemes in the real, rather, it is «a question of the complex assemblage of diverse forces [...] such that aspects of the decisions and actions of individuals, groups, organizations and populations come to be understood and regulated in relation to authoritative criteria.»⁶⁴ Thus, one ought to study the mechanisms that instantiate government: techniques of notation, computation and calculation; procedures of examination and assessment; devices such as surveys and presentational forms such as tables – and also, I should add, maps, cadastres and censuses.

Bruce Curtis provides a pointed criticism by asking how it is that centres come about and by pointing out that in Miller and Rose's interpretation no process, other than legislation, for the creation of centres is identified.⁶⁵ Centres must be anchored down in history, in historically situated social relations that make the law, in itself mere paper, into something enmeshed in people's dispositions and behaviour. As Curtis suggests, we need to «follow concrete instances of legislative regulation to determine what 'actors' indeed do.»⁶⁶ If, *a priori*, every element in the enforcement chain has the potential

ability to deflect a command, in practice, not all of them do so. One must not forget that hierarchical power relations do exist between the constitutive elements of networks and that these relations have a history. Networks do not operate in any sort of historical or social vacuum. Explanation for the «spontaneous» abidance and acceptance of the census, for instance, should be sought in an ensemble of mechanisms, to wit: socialization, schooling, patron-client relations, interests, and also in the recognition of the legitimate capacity to rule, that is, in forms of authority such as the law.

Technologies of government actively intervene in the creation of a panoptic regime of visibility. The governmental vision is served by a three-lens optics that selects different scales, objects and contents. It is a question of the central control of acts of observation, of observers and information. Map-making, census-taking and the metric system increase the legibility of objects to which they are applied, and thus help to establish the modern state's configuration of power.⁶⁷ James Scott makes a similar connection between a new regime of visibility and the modern configuration of state power. The invention and deployment of maps, censuses, cadastres and standard units of measurement shows an «enormous leap in state capacity – a move from tribute and indirect rule to taxation and direct rule. Indirect rule required only a minimal state apparatus but rested on local elites and communities who had an interest in withholding resources and knowledge from the centre». However, Scott perspicaciously draws attention to the fact that «direct rule sparked widespread resistance and necessitated negotiations that often limited the centre's power, but for the first time, it allowed the state officials direct knowledge of and access to a previously opaque society».⁶⁸ Scott himself dedicated a substantial part of his work to analysing these forms of resistance, which he called «weapons of the weak».⁶⁹

In this juncture, Edney stresses how imperfections in the Great Trigonometrical Survey of India hampered the effective control of Indian territory by the British. The geographical panopticon's promise of perfection was compromised by negotiations and disputes between the British and the Indians. The latter resisted the role of passive and docile objects of British vision, and explored the opacity of the linguistic barrier, thereby withholding or distorting information.⁷⁰ Technologies of government provide an arm long enough to reach out and touch the realm's daily doings. As such, they are material symptoms of the panoptic presence of the state, and are thus felt by commoners. They are the eyes of a new gaze, enabling the state, in Scott's phrase, to *see like a state*. Thus, to resist them is to symbolically deny the state entrance to a realm hitherto secluded.

Instead of looking at power as the *explanation* for the success of authorities in assembling networks of heterogeneous entities, we should consider power as a *product* of that assemblage.⁷¹ It is «administration effects», government, which needs to be explained. Both success and failure must share the same sociology. Both success and lack thereof in map making, metrological reform or census taking should be accounted for, not exclusively in terms of efficiency or volume of power held by authorities, but also by following the chain of translations, of *enrolment*⁷², connecting every entity, from the politician to the peasant. Therefore, it is not possible to endorse an essentialist description of the state (also present in the literature that reacts against traditional Marxist perspective postulating the relative autonomy of the state).

My research will show that to govern things and people at a distance is to exercise a precarious form of dominance. Such dominance is neither a given, nor taken for granted: it can be eroded, interrupted or destroyed if inscriptions and files are immobilized, corrupted, less legible, or less malleable.⁷³ Mechanisms of passive and

active resistance, like those described by Scott, Edney and myself, may result in the dissociation of networked entities.⁷⁴ From my point of view, the state constitutes a very successful and enduring, but nonetheless inherently fragile, asymmetry, whose historical production and reproduction is what needs to be accounted for. I propose that by taking the view from the machinery, by looking at the moving parts of the state in the process of becoming modern, one can hope to overcome the shortcomings of theoretical perspectives based on the clear-cut transition between ideal-types, such as «the traditional», the «absolutist» and «the modern nation-state».

B. Themes

Map-making

After the French Revolution, map-making everywhere became a state-led activity. In a time of nation-building and invention of traditions, the will to carry out systematic surveys at the national level and the very demanding survey technology, requiring the deployment of large and regular amounts of monies and the creation of permanent bureaucratic bodies staffed by a considerable number of engineers over a lengthy period of time, made the cartographic venture just too expensive.⁷⁵ In France, Napoleon's rise to power helped crystallize a model of cartographic organization destined to endure and proliferate across Europe. The epoch of court-appointed cartographers, like the Cassini family, was drawing to a close. The «nationalization» of French cartography took place in 1793, when, at the military's request, the Convention confiscated Cassini's *Carte de France*.⁷⁶ The French example and the Napoleonic invasions helped establish the state as the tutelary entity of cartographic surveys (as opposed to financing pooled in the market, as with the Cassini map). Certain public departments became national

cartographic authorities, with exclusive control over the surveying of their territories. These surveys were singled out by their large scale, by their systematic character, for covering the totality of national territories and for signalling the end of cartography as a state secret. Terrestrial cartography became a routine public activity, comparable to collecting taxes and maintaining a regular standing army.

Considering the inflation of the sphere of civilian scope of state apparatuses, particularly in the realms of territorial knowledge, statistics and taxation, large-scale maps were usually associated with the survey of geometric cadastre. Since the mid-eighteenth century, it was expected of parcelled cadastre that it would rationalize and augment the revenues of the fiscal machinery, in the face of ever-rising administrative and military costs.⁷⁷ The cadastre was one of the routes chosen by monarchies seeking to remove the encumbrances that the nobility, the clergy, and all sorts of title-holders of «freedoms» opposed to its assertion, in the name of *good government* and *public felicity*. For public administrators at the end of the *Ancien Régime*, the cadastre combined the goal of centralization with the principle of public felicity, because it respected both fiscal uniformity and equity.⁷⁸ All over Europe, the close bond between terrestrial cartography and cadastre seemed to many governments the best way to make fiscal exaction more effective and equitable while insulating it from pernicious external influences, either local or corporate.⁷⁹

A major development in the cartography of the last two centuries was the extraordinary flourishing of thematic cartography. Whether in agriculture, statistics, demography, hygiene, or criminology, thematic cartography emerged as a precious aide of government.⁸⁰ This development overlapped and interacted with the expansion of state administrative structures and the emergence of the social sciences. Thematic cartography boosted the cognitive effects obtained from visualisation and centrality,

thus helping to shape a new set of power relations based upon the production of knowledge asymmetries and an altogether new regime of visibility.⁸¹ Nationalist conceptions and cultural representations of the nation found a vehicle for their expression in national map surveys, especially after the example set forth by the Cassini Map and the French «hexagon».⁸²

Cartography asserted itself as a discipline. On the one hand, the surge of newly-created scientific academies and the establishment of public cartographic authorities helped to shape a disciplinary field of knowledge. *Qua* applied science, geodetic cartography was at the crossroads of spherical trigonometry, mathematical projection and statistics. As a scientific discipline, the fact that it was put into practice in map surveying resulted in a thrust to stabilize and codify a domain of knowledge. On the other hand, disciplinary institutionalisation propelled the increasing autonomy of geographical engineering within the still entangled field of engineering. Wherever autonomy increased within the framework of civilian cartographic policies, there occurred important institutional changes, such as the transference of cartographic authorities from its traditional location (the Ministry of War) to «civilian» ministries such as the Interior or Public Works.⁸³

The general principle of modern cartographic survey (high precision geodetic networks) was established in the eighteenth-century. This technology proceeds from the whole to the part, and constructs a rigid geometrical framework before filling in the topographical detail by local observation of angles and distances. Such a system depends on no more than one linear measurement, that of the primary baseline; only the angles of the triangles are measured, and the sides are computed from them by spherical trigonometry. The survey is correctly located on the Earth's surface by astronomical observation to determine the latitude and longitude of the principal stations.⁸⁴

With lithography and the development of mathematical projection, the new survey technology brought the paradigm of precision and accuracy to a hegemonic position.⁸⁵ According to this epistemological model of cognition, the aim of cartography is to produce a correct relational model of the terrain. Its assumptions are that objects in the world to be mapped are real and objective, enjoying an existence independent of the cartographer; that their reality can be expressed in mathematical terms; that systematic observation and measurement offer the only route to cartographic truth; and that this truth can be independently verified.⁸⁶

The accurate depiction of geographical reality, unlike Vermeer's beautiful though inaccurate *View of Delphos*, or any other work belonging to the tradition of graphic representation prior to this paradigm, is based on precision.⁸⁷ The heyday of the paradigm was followed by a teleological reinterpretation of cartographic history in terms of a trajectory towards ever-increasing precision, rigour and reliability, in which any development leading to higher accuracy was welcomed as progress, whereas any other would be discarded as aberration. The history of cartography, which once uncritically endorsed this powerful self-image, is now strongly challenging this frame of interpretation, namely in the work of Harley and Edney.⁸⁸

Until recently, this image of progress was echoed in historiography in general, and in Portuguese scholarship in particular. The director of the Portuguese Geodetic Department from 1848 to 1874, Folque, wrote a memoir on the history of Portuguese geodetic works, covering the period from their beginnings in 1788 to 1852.⁸⁹ The importance of this memoir is twofold: as an essential source for the whole period and as a piece of reflexive history that has since underpinned historiographical work. Apparently, the job of future generations of historians of Portuguese cartography would be to pick up where Folque had stopped, and complete his memoir. One can say the call

has been met.⁹⁰ However, in most cases, these works tend to reproduce the evolutionist interpretation of the history of cartography voiced by Folque. Echoing Cassini III, he stated that, prior to geodetic networks, all cartographic works «ought to be considered unsatisfactory rough approximations because their unique source was information provided by local informants or authorities or by means of untrustworthy astronomical observations».⁹¹

Weights and measures

In matters of weights and measures, revolutionary France was the ambivalent source of inspiration for all Europe.⁹² One of the first and most notorious revolutionary decisions taken in the wake of 1789 was to abandon the ancient system of weights and measures in favour of a new and uniform system covering the whole territory.⁹³ The aim was to prevent the multiplicity of local and regional «worlds» and «realities» from being mirrored in the multitude of local systems of weights and measures. The new homogeneous system should mirror only the fruit of national homogenesis, the *nation*.⁹⁴

In Portugal, the decision taken in 1852 to adopt the metric system as the legal system of weights and measures was meant to put an end to the typical chaos and anarchy assumed to be characteristic of a backward, *Ancien Régime* country. By mid-century, trial and error experience gathered since 1814 had brought to light two major issues concerning the reform of the system of weights and measures, to which the implementation of the metric system was but a possible answer. One had to do with the system's variation from place to place, in other words, with the lack of a standardized nomenclature, internal partition of units and, most of all, metrology. This meant that from municipality to municipality the same capacity measure would yield different results as measured against the metric standard. The second had to do with the internal

structure of the traditional system, which presented in most cases a non-decimal partition (in quarters, sixths, and eights). As the common expression would have it, this partition was thought to be «more suited to people's customs». Such non-decimal partition did not follow any specific logic and did not allow for an easy transition from the smaller to the bigger and vice-versa, nor, above all, did it seem to have any direct relation to Nature. These were, according to proponents of reform, its greatest shortcomings. On the contrary, to their mind, the metre had a solid foundation in Nature and the decimal partition allowed a frictionless transition between different metrological layers.

When attacking the traditional system, one could deplore the metrological lack of uniformity across the realm, its partition structure, or both. Many publicists and politicians thought the fundamental necessity was to extend to the entire realm a single metrology, particularly in the case of weight and capacity measures (linear measures were fairly uniform). One way to do this would be to extend the capital's measuring standards to the whole kingdom. This, however, could be achieved without doing away with traditional partitions, reasoning that these were much better fitted to custom than metric «formulas» and «theories». Enlightened rhetoric aside, the major argument in support of the reform was economic and structural: the multiplicity of weights and measures hampered the flow of commercial exchange and the development of an internal market at a nationwide scale. On the other hand, the very existence of a standardized system of weights and measures would speed up the formation of said homogeneous market, thus contributing to change the structure of Portuguese inner commerce by helping to dissolve the old structure based on small local markets (municipal level) and medium-sized regional markets (at district level), secluded from each other, between which information travelled mainly on horseback, along river

basins and coastal trade.⁹⁵ From a functional point of view, the emerging nationwide marketplace needed to share a predictable language of exchange. Not only did information about commodities, prices, crops, natural disasters, etc. have to be able to travel with ease between market places, but the very process of price formation had to rely on standardized and shared measures and measuring procedures. In a capitalistic shaped economy, terms of exchange have to be trustworthy, foreseeable and shared; one of the Liberal state's self-appointed tasks was to warrant those terms of exchange. In 1860, an official from the Department of Weights and Measures reasoned:

«Let market speculators who profit from the inequality of measures talk and complain; no one will be able to convince them anyway. Besides, the era of market squares is coming to an end: soon the market will be everywhere. Commodities will flow to wherever demand is, because the ease in means of communication has shortened distances [...] there will be an increase of internal commerce, which will be upheld by adopting a single measure. The small and the big farmer will know what they have in storage in their barns and warehouses, and what its cash worth will be in whatever point of the kingdom. They will go not just to the market next door, but to wherever is most convenient, and this will surely contribute to a uniformity of prices thus far inexistent».⁹⁶

Why, then, was something thought to be so beneficial to the unrestricted flow of commerce contested by the merchants themselves? A publicist, in 1815, submitted: «Unfortunately, the strength of habit is more powerful than reason; thus, over time, there has always been someone that not only thinks any reform in this matter is superfluous, but also that that inequality is profitable».⁹⁷ The variance of measures from place to place allowed merchants, retailers and shopkeepers to take advantage of differences between local metrologies and make a fraudulent profit. They, therefore, resisted the introduction of the metric system, as they would resist any attempt to standardize weights and measures, metric or not, across the territory.

Statistics and the census

In 1749, Gottfried Achenwall defined statistics as «the science of the constitution of the state, the art of evincing the strengths and weaknesses of a state [...] anything that can contribute to provide a rigorous idea of an empire, so that the good administrator and the truly man of state can be enlightened; in a word, the knowledge of the remarkable features of the state». In 1834, the mathematician Costaz came up with a new definition: statistics would be «the observational science whose object was to acknowledge and gather all facts that could be expressed in figures». Radicalising this line of interpretation, the French mathematician Cournot proposed, in 1843, that statistics be conceived as the «science whose object was the gathering and co-ordination of numerous facts into their particular species, in order to obtain numerical relations independent of anomalies due to chance, which could point out the existence of regular causes whose action is intertwined with chance».⁹⁸ Statistical knowledge, we learn, oscillates between two semantic poles: the descriptive science of the state; and the nomothetic knowledge, producer of relations and regularities extracted from the realm administered by the state, or even from the vast world of «social facts».

Nonetheless, Stuart Woolf points out, if nowadays statistics and public administration appear strongly connected, historically this was not always the case. To trace the roots of statistics as a vehicle for the intervention over the administered realm takes us back to parochial numberings,⁹⁹ actuarial practices by mercantilist insurance companies or to seventeenth century Swedish literacy statistics.¹⁰⁰ The medieval monastic concern with population led to an interest in the figures of fertility and mortality; the mercantilist-absolutist concern with national wealth needed numerical data on production and foreign trade.¹⁰¹ In the nineteenth century, criminologists and

sociologists gathered piles of data on types of crimes; physicians asked the conscription services for workable figures on the health of the men; hygienists demanded figures on dwelling densities; pedagogues, figures on elementary schools and student attendance.

The most important period for the intensification of properly modern statistical activities (1770-1840) corresponds precisely to the epoch of the first definition given above. To authors like Achenwall, statistics was an essentially descriptive task. Its aim was to gather and classify in the most thorough way. To classify what? Everything: the ambition was to categorize the whole of the material world and eventually the spiritual world. This period is characterised by the dissociation between statistics and mathematics. Oddly enough, the golden age of descriptive statistics, the Napoleonic *directoire*, was also witness to major strides in probability theory. In the eyes of mathematical science, the rehabilitation of statistics would have to wait for the end of the next century. The second half of the nineteenth century witnessed the identification between statistics and the emerging social science. The program of a scientific statistics was rooted in the belief that Man and his Environment could and should be studied with methods and precision comparable to that of natural and physical sciences. Adolphe Quetelet's call for a «social physics» was met in Emile Durkheim's *Le Suicide*, for instance. In the United Kingdom, basic statistical tools were developed in connection with *fin-de-siècle* eugenic concerns, in the works of Pearson, Galton and Yule.¹⁰² We have clearly moved to the second of the above quotes.

Statistical knowledge lives from and in a permanent tension. On the one hand, the need to construct higher-level realities or abstractions (e.g. birth rate) which can, as such, circulate as synthetic substitutes for multiple realities; on the other, the unavoidable requirement to be based in nominal and individualised conventions inherent to the mode of inscription (e.g. a *single* birth record).¹⁰³ Statistics uses this

creative tension to optimise the management of the multiple by way of individualisation
– a point already made by Foucault:

«Chaque fois qu'on aura affaire à une multiplicité d'individus auxquels il faudra imposer une tâche ou une conduite, le schéma panoptique pourra être utilisé. [...] il s'agit de mécanismes qui analysent des distributions, des écarts, des séries, des combinaisons; et qui utilise des instruments pour rendre visible, enregistrer, différencier et comparer: physique de un pouvoir relationnel et multiple, qui a son intensité maximale non point dans la personne du roi, mais dans les corps que ces relations, justement, permettent d'individualiser.»¹⁰⁴

The historical connection between statistics and the state was co-extensive with the expansion of the latter's administrative scope. In fact, government was Proudhon's *bête noir*:

«Chargé d'affaires du département et de l'État, officier de police judiciaire, intermédiaire, plénipotentiaire, instructeur, directeur, impulseur, inspecteur, surveillant, appréciateur, contrôleur, censeur, réformateur, redresseur, correcteur, tuteur, commandant, intendant, édile, jugeur: voilà le préfet, voilà le gouvernement!»¹⁰⁵

The process of state formation required, as Tilly, Mann, and Giddens, among others, pointed out, a set of «extractive and coercive processes», such as the permanent organization of the army, excise, and the police. The progressive establishment of official statistical *bureaux* should be seen as a subordinate and auxiliary task of the same sort, partaking of the same historical process.¹⁰⁶ In the absolutist period, official data collection focused on the domains of taxation, public finance and population. Until the eighteenth century, data was gathered at the local level, and in a decentralised manner. From the mid eighteenth century on, official statistics became instrumental to monarchical centralisation.¹⁰⁷ The statistical drive of knowledge spread to new spheres, its production becoming ever more detailed, systematic and totalising, requiring the

creation of specialised state departments, sometimes accumulating the construction of national or ministerial statistics with population census and large-scale maps.

In the wake of the political arithmetic¹⁰⁸ and cameral science of the seventeenth and eighteenth centuries, Liberalism used statistics as a government technology.¹⁰⁹ Rooted in the notion of improving knowledge to improve administration, the statistic impulse separated out new objects from the unshaped breadth of observable reality. To better govern required better knowledge; and to know better required, more and more, quantification, cartography, and measurement, all objective. We should keep in mind that objectivity was established as the sole yardstick of truth, and quantification as the single path to reality. In Porter's apt phrase, statistics was fashioned into a technology of social trust.¹¹⁰ Numbers appeared as neutral, set apart from political interests and passions, far removed from the world of intrigue. The appearance of existing beyond debate was what enabled figures to settle any debate. This depiction of statistics as the science of governance is very clear in the words of the oft-quoted Moreau de Jonnés¹¹¹, this time around invoked by a section head in the Portuguese Statistics Department:

«Statistics is the science of natural, social and political facts, expressed in numbers. Its object is the profound knowledge of society insofar as concerns its nature, its elements, its economy, its situation and its movements. Its language is that of digits, which lends it the precision and certainty of the exact sciences. [§] It is like to history, when gathering facts past and present, but it differs in its essence, since history nearly always focuses the interest of its narratives in battles and conquests, and statistics concerns itself with the fruits of peace. »¹¹²

Through the power/knowledge discourse that institutes, speaks, and writes them, these statistical objects, from «the individual» to «the population», are created as unbounded recipients of reform, that is, as the object of endless cycles of decision, assessment and reform.¹¹³ They are formless clay in the hands of a new lord. The most decisive

characteristic of quantification is that it is a technology of distance, a way of making the absent present, of miniaturizing it, in sum, of taming it.¹¹⁴ That is why the centre's capacity to remotely control these objects, the capacity to govern them from a distance, is amplified.¹¹⁵ It is precisely this trait, which confers to the «modern nation-state» its specifically modern character, and distinguishes it from earlier forms.¹¹⁶

However, we must not believe, as often happens, that in Liberalism the purposes served by this statistical thrust, and specifically by the census and civil registration, were exclusively those of control and wide surveillance of the population. The exercise of administrative power by the state implied the attribution of new rights to the individual, rights whose exercise supposed the existence of, depended upon, these forms of record. For instance, the ownership of property, the legality of contracts, the reform of the sanitary state, improvements in the social incidence of birth rates and mortality, even the secular emancipation from parochial registries.¹¹⁷ In the absence of statistics, the legislator asks in 1864, how are we to «regulate that which concerns public subsistence, taxation, marital status, social transactions, public enforcement, all the branches, in sum, that the body politic embraces in its various relations?»¹¹⁸

The statistical base unit in the *Ancien Régime* was the family, the «household». Until the end of the eighteenth century, European states counted *neighbours* or households, and then used these «numberings» to distribute the fiscal effort by the villages and conscript men to the army. The widespread adoption of census practices, with nominal population counts, inscription in standardised formularies, simultaneity of operation and periodical repetition, is characteristic of the nineteenth century. The recruitment of soldiers, apportioning of land-based taxes, elaboration of electoral registries and a wide number of governmental decisions all hinged upon this.

If the state's thirst for statistical knowledge was linked to the definition and policing of deviance and peril, via the dispensation of sanctions, the restriction of freedoms and the control over space, it is undeniable that it also partook of what T. H. Marshall called civil, political and social citizenship. Official statistics both enables and constrains. Simultaneously, it empowers the exercise of citizenship within the scope of the social contract, and keeps that exercise within certain limits (for example, if it aided the exercise of the right to vote, it helped, on the other hand, to police the censitary thresholds).¹¹⁹ From the standpoint of the subject's relationship with the collective, it was about shaping «an individual who comes to act as a self-regulating calculating person, albeit one located within asymmetrical networks of influence and control» and about widening the reach of this government technology to the greatest possible number of spheres of social life.¹²⁰ For, as Porter points out, «the quantitative technologies used to investigate social and economic life work best if the world they aim to describe can be remade in their image.»¹²¹

Moreover, the discourse of statistics and that of the emerging social science started to penetrate the political public sphere and to entwine with the discourse of nationalism. According to Woolf, the fabrication of French post-revolutionary identity was supported by a statistical work that constructed a normalised realm. «*La France une et indivisible*» was to be constructed by the very act of cataloguing the numerous variations left by the environment and history. The unity was built as uniformity, to be obtained by the identification and limitation of local differences. Statistics was the chosen instrument for this self-appointed role of directing the life of society.¹²² In the Italian peninsula, before unification, patriots used statistics to evoke the «body» of a political entity which did not yet exist: Italy, the (statistically) imagined community. After unification, statistics was fully enlisted in the very construction of the nation state.

Italian statisticians «provided a map of the country, monitored its movements and looked for its laws, counted its resources, its people above everything, and tried to link together more closely centre and periphery».¹²³

C. Putting the object into focus

As I have tried to show in section A, the formation of the modern state can be conceived as a great historical transformation in the nature of society, particularly in its power equilibriums. Some state functions figure prominently in this process: the control of the territory, the overseeing of the population, the regulation of disputes, taxation in connection to warfare, conscription, and the imposition of a legitimate knowledge order. The authoritative enforcement of these functions did not dispense with the formulation of policies or political rationales. Given my concern with looking at the machinery of the state in the process of becoming modern, any of these «functions» would provide a possible avenue of inquiry. From all those possible topics, I have chosen to focus on «geographic information policies» dealing with territory (cartography), metrology (weights and measures) and population (census), in a specific historical context, that of Portugal in the second half of the nineteenth century.

In Portugal, starting with the defeat of «absolutism» in 1834, at the end of the civil war, but notoriously from 1851 onwards, constitutional monarchic governments undertook an ambitious and self-conscious modernisation program. Following a tendency which can be traced back to the late *Ancien Régime*, this program sought to reform territorial management, taxation, judiciary and administrative structures, communication infrastructures and the «*fomento*», that is, the public and organised fostering of economic life (namely, industry, mining and agriculture). However, as scholars have shown¹²⁴, Portuguese governments did not possess enough information to

carry out this program. Reliable statistics, accurate topographic maps, and credible census figures were lacking. The report presented to the government by the Council of Public Works and Mines in 1854 reads as follows:

«The construction of communication infrastructures and the transportation industry give rise to extremely interesting economic issues, though little studied in their application to our country; and it could not have been otherwise, because the beacon that illuminates them, statistics, without which good and regular administration lacks solid ground, is still lagging behind amongst us; and if figures, which represent the truthful worth and importance of social facts, are lacking, on the other hand, the Kingdom's geographical and physical description is still very far from being able to assess, in the drawing of inner thoroughfares, the advantages to be obtained and the sacrifices to be made [...] This shortage of data, felt in road planning and building and in the outline of railways, is felt most of all in the improvement of navigation routes [...] The lack of topographical and geological charts, of enough levellings and meteorology and hydrology observations, is known to all. This want is acutely suffered in all engineering projects».¹²⁵

Geographic information policies are the public policies enacted by the government in order to fill in these information gaps.¹²⁶ How do geographic information policies relate to the wider state formation issue? In theory, these policies ought to enhance the state's resources and administrative capacities, leading to the accumulation of increasing amounts of information and power in the centre. Through them, the state would short-circuit the intermediary roles enjoyed by local elites, large proprietors, the Church or professional corporations, finally tilting the centre-periphery balance in favour of the centre. This program would have the consequence of encapsulating the individual in a wider life, the life of the nation. From then on, the individual would no longer be seen solely as *the conscript* and *the taxpayer* but rather, in the long run, as the holder of ever increasing rights (political, social and economical).

In practice, these policies had to do with very precise objects or actions: survey of large-scale maps and parcelled cadastre, the carrying out of population census, the enforcement of the metric system; subsequently, also with erecting bureaucratic apparatuses. In the landscape of nineteenth century Europe, the Napoleonic administrative legacy¹²⁷ and the drive of states to centralise and modernise concurred towards the generalised formation of national cartographic *bureaux*. The close association between terrestrial cartography and cadastre seemed to many governments the best way to make fiscal exaction more effective and equitable, while insulating it from vicious external influences. The progressive adoption of the metric system in most European countries was conceived as a way to ease economic exchange and facilitate the assembly of a homogeneous and unobstructed economic space, at the national level. The general census of the population was an acute administrative need as well as a key instrument for political management, but also for the entitlement of the citizenry.

In the present dissertation I look at the following geographic information policies: i) the surveying of geodetic based large-scale maps under the tutelage of a national cartographic authority; ii) the implementation of the metric system, related to the consolidation of a unified nationwide economic space; iii) the execution of what was entitled the «first modern census» in 1864.

Notes

¹ Pierre-Joseph Proudhon, *Idée générale de la révolution au XIXe siècle. Oeuvres complètes. Nouvelle édition publiée avec des notes et des documents inédits sous la direction de C. Bouglé et H. Moysset*, Genève, Slatkine, 1982 [1851], p. 344.

² Max Weber, *Economy and Society*, Guenther Roth and Claus Wittich eds., Berkeley, University of California Press, 1978, pp. 55 and 65.

³ Michael Mann, «The autonomous power of the state: its origins, mechanisms and results», in John Hall, ed., *States in History*, London, Basil Blackwell, 1986, pp. 109-136, here p. 112; Cf. Charles Tilly, «War making and State making as organized crime» in John Hall, ed., *The State. Critical concepts*, vol. I., London/New York, 1994 [1985], pp. 508-529, here pp. 519-520.

⁴ Despotic power: «the range of actions which the elite is empowered to undertake without routine, institutionalised negotiation with civil society groups» in Mann, «The autonomous...», op. cit., 1986, p. 113; Cf. concepts of «capstone» and «organism» in John Hall, «Capstones and organisms» in John Hall, *Coercion and Consent. Studies on the Modern State*, Cambridge, Polity Press, 1994, pp. 1-30.

⁵ Anthony Giddens, *The Nation-State and Violence*, Cambridge, Polity Press, 1985, pp. 13-15.

⁶ Anthony Giddens, «The Nation-States and Violence», in Anthony Giddens, *Social Theory and Modern Sociology*, Cambridge, Polity Press, 1987, pp. 160-182.

⁷ Perry Anderson, *Lineages of the Absolutist State*, London, Verso, 1974.

⁸ Otto Hintze, «Military organization and the organization of the state» in John A. Hall, ed., *The State. Critical concepts*, vol. I, London/New York, 1994 [1975], pp. 181-202, here p. 188.

⁹ Charles Tilly, *Coercion, Capital and European States. AD 990-1990*, Oxford, Basil Blackwell, 1990.

¹⁰ Tilly, «War making...», op. cit., 1994 [1985], p. 521.

¹¹ Otto Hintze, «Military organization...», op. cit., 1994 [1975], p. 189.

¹² Pierre Bourdieu, «Esprits d'Etat. Genèse et structure du champ bureaucratique», *Actes de la Recherche en Sciences Sociales*, 96/97, Mars, 1993, pp. 49-62, here pp. 49-55; Pierre Bourdieu, «De la maison du roi à la raison d'État. Un modèle de la genèse du champ bureaucratique», *Actes de la Recherche en Sciences Sociales*, 118, 1997, pp. 55-68, here pp. 63-68.

¹³ Norbert Elias, *O Processo Civilizacional*, vol. I, Lisbon, Dom Quixote, 1989, pp. 93-107.

¹⁴ Norbert Elias, *The Court Society*, Pantheon Books, New York, 1983 [1969].

¹⁵ Giddens, *The Nation-State...*, op. cit., 1985, pp. 187-192.

¹⁶ Michel Foucault, *Surveiller et Punir*, Paris, Gallimard, 1975, pp. 214-217.

¹⁷ See, for a similar approach, John Brian Harley, «Deconstructing the map», *Cartographica*, 26 (2), 1989, pp. 1-20; See Barbara Belya, «Images of power: Derrida, Foucault, Harley», *Cartographica*, 29 (2), 1992, pp. 1-9 for a sharp critique.

¹⁸ Foucault, *Surveiller...*, op. cit., 1975, p. 199.

¹⁹ Matthew H. Edney, *Mapping an Empire. The geographical construction of British India, 1765-1843*, Chicago/London, The University of Chicago Press, 1997, p. 39.

²⁰ Foucault, *Surveiller...*, op. cit., 1975, p. 206.

²¹ Christopher Dandeker, *Surveillance, Power and Modernity. Bureaucracy and discipline from 1700 to the present day*, Cambridge, Polity Press, 1990, pp. 193-227.

²² Enrico Iachello, «Centralisation étatique et pouvoir local en Sicile au XIXième siècle», *Annales HSS*, January-February, 1994, pp. 241-266.

²³ John Hall and I. C. Jarvie, eds., *Transition to Modernity. Essays on power, wealth and belief*, Cambridge, Cambridge University Press, 1992.

²⁴ Pedro Tavares de Almeida, *Eleições e caciquismo no Portugal oitocentista (1868-1890)*, Lisbon, Difel, 1991; Pedro Tavares de Almeida, *A construção do Estado Liberal. Elite política e burocracia na «Regeneração» (1851-1890)*, mimeo., Ph.D. dissertation in Political Sociology, FCSH/UNL, Lisbon, 1995; António Manuel Hespanha, *As vésperas do Leviathan. Instituições e poder político. Portugal – séc. XVII*, Coimbra, Almedina, 1994; Rui Miguel Branco, *O Mapa de Portugal. Estado, Território e Poder no Portugal de Oitocentos*, Lisbon, Livros Horizonte, 2003, pp. 116-118.

²⁵ Linda Weiss and John Hobson, *States and Economic Development. A comparative historical analysis*, Cambridge, Polity Press, 1995, pp. 1-92, here pp. 4-8.

²⁶ Michael Mann, *The Sources of Social Power. The rise of classes and nation-states, 1760-1914*, Vol. II, Cambridge, Cambridge University Press, 1986, pp. 479-509.

²⁷ A. H. Oliveira Marques, *História de Portugal. Das Revoluções Liberais aos Nossos Dias*, vol. III, Lisbon, Palas Editores, 1981; Joel Serrão, *Da «Regeneração» à República*, Lisbon, Livros Horizonte, 1990; Almeida, *A Construção...*, op. cit., 1995; J. Amado Mendes, «Comércio, transportes e comunicações» in José Mattoso, dir., *História de Portugal*, vol. v, 1993, pp. 369-379; Rui Ramos, «O sistema fontista» in António Reis, dir., *Portugal Contemporâneo (1851-1910)*, vol. II, Lisbon, Publicações Alfa, 1990, pp. 125-146.

²⁸ Almeida, *A Construção...*, op. cit., 1995, pp. 253-256.

²⁹ Maria Eugénia Mata, *As Finanças Públicas Portuguesas da Regeneração à Primeira Guerra Mundial*, Lisbon, Banco de Portugal, 1993; Maria Fernanda Alegria, «Política ferroviária do fontismo. Aspectos da construção e do financiamento da rede», *Revista de História Económica e Social*, n. 23, May-August, 1988, pp. 43-63.

³⁰ David Justino, *A formação do espaço económico nacional. Portugal 1810-1913*, vol. I, Lisbon, Vega, 1988, p. 19; Almeida, *A construção...*, op. cit., 1995, p. 239; Luís Espinha da Silveira, «Estado liberal e centralização: reexame de um tema» in Luís Espinha da Silveira, ed., *Poder central, poder regional, poder local. Uma perspectiva histórica*, Lisbon, Edições Cosmos, 1997, pp. 65-84, here p. 82; Branco, *O Mapa...*, op. cit., 2003, p. 106.

³¹ Maria de Fátima Bonifácio, *Seis Estudos Sobre o Liberalismo Português*, Lisboa, Estampa, 1991.

³² Mendes, «Comércio, transportes...», op. cit., pp. 369-379; Marques, *História de Portugal...*, op. cit., 1981; Serrão, *Da «Regeneração»...*, op. cit., pp. 150-153.

³³ Almeida, *Eleições e caciquismo...*, op. cit., 1991.

³⁴ Almeida, *A Construção...*, op. cit., 1995.

³⁵ Luís Espinha da Silveira, *Território e Poder. Nas origens do Estado Contemporâneo em Portugal*, Cascais, Patrimonia Historica, 1997; Espinha da Silveira, «Estado Liberal...», op. cit., 1997.

³⁶ Maria Eugénia Mata, *As finanças públicas portuguesas da Regeneração à I República*, mimeo., Ph.D. dissertation, Instituto Superior de Economia/UTL, Lisbon, 1985; Mata, *As Finanças...*, op. cit., 1993.

³⁷ Branco, *O Mapa...*, op. cit., 2003, *maxim* chapters V and VI, pp. 85-150.

³⁸ Paulo Silveira e Sousa, «A Construção do Aparelho Periférico do Ministério da Fazenda em Portugal (1832-1878)», in Pedro Tavares de Almeida e Rui Miguel C. Branco, dirs., *Estado e Território. Portugal e Espanha. Séculos XIX-XX*, Lisbon, Livros Horizonte, 2005 (awaiting publication).

³⁹ See Almeida, *A Construção...*, op. cit., 1995. From 1842 to 1878, period in which the 1842 Administrative Code was in force, the state's peripheral administration included the «distritos» (districts), headed by the prefect («governador-civil») and the administration of municipalities («administração dos concelhos») headed by the municipal administrator («administrador de concelho»); there was also de «regedor de paróquia» (parish commissar), though not a magistrate, he performed administrative duties. Alongside these state-appointed offices there were elected bodies of administration, such as the «câmaras municipais» (municipalities), headed by the mayor, and the municipal body, composed of aldermen; and the «juntas de paróquia» (parish councils), headed by their inherent president, the parish priest. See also Silveira, *Território e Poder...*, op. cit., 1997.

⁴⁰ Macro and micro refer to different perspectives on the recursive organization of human agency, of social practice. Macro and micro do not refer to different things, but to the same thing as seen through different perspectives. «Macro» stands for the analytical level in which human agency is recursively organized over time and space. The social organization of human agency over time and space I call institutions. To this extent, macro refers also to the structural plane, since «structuration» is the process through which micro actions are transformed into macro collectives, over time and space. «Micro» is the analytical level in which one looks at agency as situated social practice, that is, as action taking place in a certain space and time, by a specific someone. Macro and micro do not refer either to the localization of action in relation to a centre in a given historical territory (central/local), or to the hierarchical distribution of power/knowledge in terms of geographical regions (centre/periphery).

⁴¹ In this section I shall focus on map-making as an example, keeping in mind that the following points can, and will, be made about census-taking and the metric reform.

⁴² On this point, see Bruno Latour, *We have never been modern*, New York, Harvester, 1991.

⁴³ John Law, «On the methods of long-distance control: vessels, navigation and the Portuguese route to India», in John Law, ed., *Power, Action and Belief. A New Sociology of Knowledge?*, London/Boston, Routledge & Kegan Paul, 1986, pp. 234-265, here pp. 233-235.

⁴⁴ Bruno Latour, «Joliot: l'histoire et la physique mêlées», in Michel Serres, dir., *Éléments d'Histoire des Sciences*, Paris, Bordas, 1989, pp. 493-513, here pp. 503-513.

⁴⁵ Law, «On the methods...», op. cit., 1986, p. 235.

⁴⁶ Michel Callon, «Society in the Making: The study of Technology as a Tool for Sociological Analysis», in Wiebe E. Bijker, Thomas P. Hughes and Trevor Pinch, eds., *The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology*, Cambridge MA, MIT Press, 1987, pp. 83-103, here p. 92.

⁴⁷ Bruno Latour, «Visualization and cognition. Thinking with eyes and hands», in H. Kuklick and E. Long, eds., *Knowledge and Society: studies in the sociology of cultures past and present*, vol. 6, Greenwich, JAI Press, 1986, pp. 14-20.

⁴⁸ Latour, «Visualization...», op. cit., pp. 6-7, 20-23; Bruno Latour, *Science in Action. How to Follow Scientists and Engineers Through Society*, Cambridge MA, Harvard University Press, 1987, pp. 64-68, 227.

⁴⁹ John Law, «Technology and Heterogeneous Engineering: The Case of Portuguese Expansion», in Wiebe E. Bijker, Thomas P. Hughes and Trevor Pinch, eds., *The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology*, Cambridge MA, MIT Press, 1987, pp. 111-134, here p. 113 (emphasis in the original).

⁵⁰ Callon, «Society...», op. cit., 1987, p. 92.

⁵¹ Law, «On the methods...», op. cit., 1986, p. 234.

⁵² Foucault, *Surveiller...*, op. cit., 1975, p. 27.

⁵³ Callon, «Society...», op. cit., 1987, p. 93.

⁵⁴ See Anthony Giddens, *The Constitution of Society. An outline of a Theory of Structuration*, Cambridge, Polity Press, 1984.

⁵⁵ Michel Callon and Bruno Latour, «Unscrewing the big Leviathan: how actors macro-structure reality and how sociologists help them to do so» in Karin Knorr-Cetina and Aaron V. Cicourel, eds., *Advances in social theory and methodology. Toward and integration of micro- and macro-sociologies*, Boston/London, Routledge & Kegan Paul, 1981, pp. 277-303, here pp. 285-286.

⁵⁶ Pierre Bourdieu, «Esprits d'Etat. Genèse et structure du champ bureaucratique», *Actes de la Recherche en Sciences Sociales*, 96/97, Mars, 1993, pp. 49-62, here p. 54. Vd. Latour, *Science in Action...*, op. cit., 1987, p. 229.

⁵⁷ For a seminal formulation, although from a marxist perspective, see António Manuel Hespanha, dir., *Poder e Instituições na Europa do Antigo Regime*, Lisbon, Gulbenkian, 1984, p. 75.

⁵⁸ Michel Foucault, «Governmentality», Graham Burchell, Colin Gordon and Peter Miller, eds., *The Foucault Effect: studies in governmentality with two lectures by and an interview with Michel Foucault*, Chicago, University of Chicago Press, 1991 [1978], p. 102.

⁵⁹ Nikolas Rose and Peter Miller, «Political power beyond the State: problematics of government», *British Journal of Sociology*, 43 (2), 1992, pp. 173-201, here p. 174.

⁶⁰ Matthew G. Hannah, *Governmentality and the Mastery of the Territory in Nineteenth Century America*, Cambridge, Cambridge University Press, 2000, pp. 24-25.

⁶¹ *Nota bene*: governmentality does not replace sovereignty; rather, permeates it. «Accordingly, we need to see things not in terms of the replacement of a society of sovereignty by a disciplinary society and the subsequent replacement of a disciplinary society by a society of government; in reality, one has a triangle: sovereignty-discipline-government, which has its primary target the population and its essential mechanism the apparatuses of security [...] Three movements: government, population, political economy, which constitute from the eighteenth century onwards a solid series, one which even today has assuredly not been dissolved» in Foucault, «Governmentality», op. cit., [1978], p. 102.

⁶² «Rationality of government» will thus mean «a way or system of thinking about the nature of the practice of government (who can govern; what governing is; what or who is governed), capable of making some form of that activity thinkable and practicable both to its practitioners and to those upon whom it was practiced» in Colin Gordon, «Governmental rationality: an introduction» in Burchell, Gordon and Miller, *The Foucault Effect...*, op. cit., 1991, pp. 1-52, quote p. 3.

⁶³ Peter Miller, «Governing by numbers: why calculative practices matter», *Social Research*, 68 (2), 2001, pp. 379-396, here p. 379.

⁶⁴ Rose and Miller, «Political power...», op. cit., 1992, p. 183. See, for a sharp critique, Bruce Curtis, «Taking the state back out: Rose and Miller on political power», *British Journal of Sociology*, 46 (4), 1995, pp. 575-589.

⁶⁵ Rose and Miller, «Political power...», op. cit., 1992, pp. 189-190; Curtis, «Taking the state...», op. cit., 1995, p. 584. See Miller and Rose's response to Curtis in Peter Miller and Nikolas Rose, «Political thought and the limits of orthodoxy: a response to Curtis», *British Journal of Sociology*, 46 (4), 1995, pp. 590-597.

⁶⁶ Curtis, «Taking the state...», op. cit., 1995, p. 584.

⁶⁷ François Ewald, «Norms, Discipline and the Law», *Representations*, vol. 30, 1990, pp. 138-161, here pp. 159-160.

⁶⁸ James C. Scott, *Seeing like a State. How certain schemes to improve human condition have failed*, New Haven, Yale University Press, 1998, p. 77.

⁶⁹ James C. Scott, *Weapons of the weak. Everyday forms of peasant resistance*, New Haven, Yale University Press, 1985; James C. Scott, *Domination and the Arts of Resistance: hiddens transcripts*, New Haven, Yale University Press, 1990.

⁷⁰ Matthew H. Edney, *Mapping an Empire. The Geographical Construction of British India*, Chicago, Chicago University Press, 1997, pp. 325-332.

⁷¹ A point made by Latour in «The powers of association» in John Law, ed., *Power, Action and Belief. A New Sociology of Knowledge?*, London/Boston, Routledge & Kegan Paul, 1986, pp. 264-280, p. 265

⁷² On the concept of enrolment, vd. Michel Callon, «Some elements of a sociology of translation: domestication of the scallops and the fishermen of St. Brieuc Bay», in John Law, ed., *Power, Action, and Belief. A New Sociology of Knowledge?*, London/Boston, Routledge & Kegan Paul, 1986, pp. 196-233, definition pp. 206-211; and Michel Callon, «Society...», op. cit. 1987, p. 96.

⁷³ Latour, «Visualization...», op. cit., 1986, p. 29.

⁷⁴ Scott, *Weapons...*, op. cit., 1985 and Scott, *Domination...*, op. cit., 1990; Edney, *Mapping...*, op. cit., 1997, pp. 325-332; Branco, *O Mapa ...*, op. cit., 2003, pp. 116-188, 138-142.

⁷⁵ Joseph Konvitz, *Cartography in France. 1660-1848. Science, Engineering and Statecraft*, Chicago/London, University of Chicago Press, 1987, pp. 32-61; Jacques Revel, «Knowledge of the territory», *Science in Context*, 4 (1), 1991, pp. 133-161, here p. 156.

⁷⁶ Monique Pelletier, «Des Cartes pour partager: divisions administratives, frontières, plans terriers du 16e au 18e siècle» in AA.VV., *La Cartografia Francesa. 5è Curs del Cicle de conferències sobre Història de la Cartografia*, Barcelona, Institut Cartogràfic de Catalunya, 1996, pp. 17-32, here p. 25.

⁷⁷ Richard Bonney, «The Eighteenth Century. II. The Struggle for Great Power Status and the End of the Old Fiscal Regime» in Richard Bonney, ed., *Economic Systems and State Finance*, Oxford, Clarendon Press/European Science Foundation, 1995, pp. 315-390.

⁷⁸ Juan Pro Ruiz, *Estado, geometría y propiedad. Las orígenes del catastro en España, 1715-1941*, Madrid, Ministerio de Economía y Hacienda, 1992; Antonella Alimento, «Entre justice distributive et développement économique: la lutte pour la création de cadastres généraux au 18e siècle» in Erk Volkmar Heyen, ed., *Jahrbuch für Europäische Verwaltungsgeschichte 13*, Baden-Baden, Nomos, 2001, pp. 1-27, here p. 7.

⁷⁹ Rui Miguel Branco, «Da Carta Topographica do reino à Carta Chorographica do reino: políticas e modelos cartográficos em Portugal (1788-1852)», *Penélope*, 26, 2002, pp. 31-59, here pp. 33-34, 38-47.

⁸⁰ Gilles Palsky, *Des chiffres et des cartes. La cartographie quantitative au XIX ieme siècle*, Paris, Ministère de l'Enseignement Supérieur et de la Recherche/CTHS, 1996, pp. 101-102; Michael Biggs, «Putting the State on the Map: Cartography, Territory, and European State Formation», *Comparative Studies in Society and History*, 41 (2), 1999, pp. 374-405.

⁸¹ Latour, «Visualization...», op. cit., 1986.

⁸² Revel, «Knowledge...», op. cit., 1991, p. 147; Konvitz, *Cartography...*, op. cit., 1987, p. 15.

⁸³ Francesc Nadal and Luis Urteaga, «Cartografía y Estado: los mapas topográficos nacionales y la estadística territorial en el siglo XIX», *Geo Critica*, nº 88, July, 1990, pp. 7-59; Rui Miguel Branco, *O Mapa...*, op. cit., 2003.

⁸⁴ R. A. Skelton, «Cartography» in C. Singer, E. J. Holmyard, A. R. Hall and T. I. Williams, *A History of Technology. The Industrial Revolution (ca.1750 to ca.1850)*, vol. IV, Oxford, The Clarendon Press, 1948, pp. 596-628; G. R. Crone, *Maps and their makers: an introduction to the history of cartography*, 4th ed., London, Hutchinson University Library, 1968.

⁸⁵ Jeremy Black, *Maps and history. Constructing images of the past*, New Haven/London, Yale University Press, 1997.

⁸⁶ John Brian Harley, «Deconstructing the Map», *Cartographica*, vol. 26, n. 2, 1989, pp. 1-20; see also John Brian Harley, «Maps, knowledge, and power», in Dennis Cosgrove and Stephen Daniels, eds., *The iconography of landscape*, Cambridge, Cambridge University Press, 1988, pp. 277-311.

⁸⁷ Lorraine Daston and Peter Gallison, «The Image of Objectivity», *Representations*, vol. 40, Fall, 1992, pp. 81-128; Theodore Porter, «Making Things Quantitative», *Science in Context*, 7(3), 1994, pp. 389-407.

⁸⁸ Vd. Harley, «Maps, knowledge, and power», op. cit., 1988, pp. 277-312; Harley, «Deconstructing...», op. cit.; 1989; and Edney, *Mapping...*, op. cit., 1997. For an incisive critique of Harley's perspective, according to which he confuses knowledge and power, reducing the former to a mere tool of the latter, vd. J. H. Andrews, «Introduction: Meaning, Knowledge, and power in the Map Philosophy of J.B. Harley» in

John Brian Harley, *The New Nature of Maps: essays in the history of cartography*, edited by Paul Laxton, Baltimore MD, John Hopkins University Press, 2001, pp. 1-33.

⁸⁹ Filipe Folque, *Memória sobre os Trabalhos Geodesicos Executados em Portugal Publicada por Ordem se Sua Majestade*, 4 vols., Lisbon, Tip. da Academia Real das Sciencias, 1841-1852.

⁹⁰ João da Cunha Bellem, «Notícia histórica do Instituto Geográfico e Cadastral», *Boletim do Instituto Geográfico e Cadastral*, vol. I, 1934, pp. 9-35; Adelino Paes Clemente, «A triangulação fundamental do país», *Boletim do Instituto Geográfico e Cadastral*, vol. II, 1937, pp. 7-176; Adelino Paes Clemente, «Relatório sobre os trabalhos geodésicos e cadastrais executados em Portugal pelo I.G.C. e organismos que o precederam», *Boletim do Instituto Geográfico e Cadastral*, vol. III, 1943, pp. 293-320; Adelino Paes Clemente, «O cadastro geométrico da propriedade rústica do país», *Boletim do Instituto Geográfico e Cadastral*, vol. IV, 1960, pp. 7-212; Luís de Pina manique, *Subsídios para a história da cartografia portuguesa. A Carta Geral do Reino – A Carta Topográfica de Lisboa – A instituição da litografia nos serviços geográficos portugueses*, Lisbon, separata do *Boletim do Instituto Geográfico e Cadastral*, vol. III, 1943; Humberto Gabriel Mendes, «Subsídios para a história da cartografia e engenharia portuguesas no século XIX», *Revista do Instituto Geográfico e Cadastral*, n. 1, December, 1981, pp. 25-74; José Antunes Simão, *Breves notas sobre As origens e antecedentes do Instituto Português de Cartografia e Cadastral*, Lisbon, IPCC, 1995.

⁹¹ Manique, *Subsídios...*, op. cit., 1943, pp. 8-9 provides an example of such an acritical endorsement.

⁹² Adrien Favre, *Les origines du système métrique*, Paris, Presses Universitaires de France, 1931; Ronald Edward Zupko, *Revolution in measurement: Western European weights and measures since the Age of Science*, Philadelphia, American Philosophical Society, 1990.

⁹³ Stuart Woolf, «Statistics and the modern state», *Comparative Studies in Society and History*, 31 (3), July, 1989, pp. 588-604.

⁹⁴ Jaques Revel and Daniel Nordman, «La formation de l'espace français» in André Burguière and Jacques Revel, dir., *Histoire de la France. L'Espace français*, Paris, Seuil, 1989, pp. 33-174, here pp. 87-96, 152-162.

⁹⁵ David Justino, *A formação do espaço económico nacional. Portugal 1810-1913*, vol. II, Lisbon, Vega, 1989, pp. 194-200.

⁹⁶ Francisco Teixeira da Silva, «Relatorio acerca do ensino do systema metrico no districto de Coimbra», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. III, 1860, pp. 280-283, quote p. 282.

⁹⁷ Sebastião Francisco de Mendo Trigoso, *Memoria sobre os pesos e medidas portuguezas, e sobre a introdução do systema metrico-decimal*, Lisbon, Oficina da Academia Real das Ciências, [1815], p. 4.

⁹⁸ Fernando de Sousa, *A História da Estatística em Portugal*, Lisboa, INE, 1995, pp. 8-9.

⁹⁹ Sousa, *História...*, op. cit., 1995, pp. 25-44.

¹⁰⁰ Woolf, «Statistics...», op. cit., 1989, p. 588.

¹⁰¹ Mary Poovey, *A history of the modern fact*, Chicago, Chicago University Press, 1998.

¹⁰² Donald MacKensie, *Statistics in Britain 1865-1930. The Social Construction Of Scientific Knowledge*, Edimburgh, Edimburgh University Press, 1981.

¹⁰³ Alain Desrosières, *La politique des grands nombres*, Paris, La Découverte, 1993.

¹⁰⁴ Foucault, *Surveiller...*, op. cit., 1975, pp. 207-210.

¹⁰⁵ Pierre-Joseph Proudhon, *Idée...*, op. cit., 1982 [1851], p. 320. I am thankful to John Torpey and Jane Caplan for having pointed out this quote in their paper in the workshop «Identity, Institutions, Practices» organised by Peter Becker and Glenda Sluga, held at the EUI on the 21st May 2001.

¹⁰⁶ From Charles Tilly, *The Formation of National States in Western Europe*, Princeton NJ, Princeton University Press, 1975 and *Coercion, Capital and European States. AD. 990-1990*, Oxford, Basil Blackwell, 1990; Michael Mann, *The Sources of Social Power...*, op. cit., vol. II, 1995, pp. 44-91; Giddens, *The Nation-State...*, op. cit., 1985.

¹⁰⁷ André Burguière, «La centralisation monarchique et la naissance des sciences sociales. Voyageurs et statisticiens à la recherche de la France à la fin du 18^{ème} siècle», *Annales HSS*, n. 1, 2000, pp. 199-218.

¹⁰⁸ Peter Buck, «People Who Counted: Political Arithmetical in the Eighteenth Century», *Isis*, 73 (266), 1982, pp. 28-45.

¹⁰⁹ See the article «Government Statistics», in David L. Sills, dir., *International Encyclopedia of the Social Sciences*, New York, The Macmillan Company & The Free Press, 1972, pp. 230-240. On the connection between statistics and state building, see Paul Starr, «The Sociology of Official Statistics», in William Alonso e Paul Starr, dir., *The Politics of numbers*, New York, Russel Sage Foundation, 1987, pp. 7-57, here pp. 15-20.

- ¹¹⁰ Theodore M. Porter, *Trust in numbers. The pursuit of objectivity in science and public life*, Princeton NJ, Princeton University Press, 1996, pp. 49 and 90.
- ¹¹¹ Director of the *Statistique Generale de la France*, department created in 1834, he led the French national census of 1835. A leading figure in French statistics of the first half of the nineteenth century. This omnipresence extended to Spain: vd. Mariano Carreras y Gonzalez, «El movimiento contemporáneo de las doctrinas y las prácticas económico-estadísticas en España», *Memorias da Academia Real das Sciencias de Lisboa*, new series, T. VI Lisbon, Typ. da Academia, 1885, pp. 3-17, here p. 7 and Juan Sanchez-Lafuente Fernandez, *Historia de la Estadística como Ciencia en España (1500-1900)*, Madrid, INE, 1975, pp. 191-200.
- ¹¹² Moreau de Jonnés, *Compendio de Estadística*, Lisbon, 1851, quoted by João da Costa Brandão e Albuquerque, *Censo de 1864. Relação das freguezias do continente e ilhas. População, sexos, fogos. Divisão civil, militar, judicial e eclesiástica*, Lisbon, Tip. Gazeta de Portugal, 1866, p. III.
- ¹¹³ Hannah, *Governmentality...*, op. cit., 2000, p. 18.
- ¹¹⁴ Cf. Porter, *Trust in numbers...*, op. cit., 1996, p. ix.
- ¹¹⁵ Rose and Miller, «Political power...», op. cit., 1992, pp. 173-201; Latour, *Science in Action...*, op. cit., 1987, pp. 219-257.
- ¹¹⁶ Giddens, *Nation-State and Violence...*, op. cit., 1985, here p. 182.
- ¹¹⁷ Edward Higgs, «Citizen Rights and Nationhood», in Erk Volkmar Heyen, dir., *Administration and Administrative Law in France and England (18th/19th c.)*. *Yearbook of European Administrative History*, n. 8, Baden-Baden, Nomos, 1996, pp. 285-302, *maxim* pp. 295-300.
- ¹¹⁸ Report annexed to decree 28-12-1864, which creates the «Conselho Geral de Estatística».
- ¹¹⁹ Edward Higgs, «The Rise of the Information-State: the Development of Central State Surveillance of the Citizen in England, 1500-2000», *Journal of Historical Sociology*, 14 (2), 2001, pp. 175-197, here pp. 181-186.
- ¹²⁰ Miller, «Governinng by Numbers...», op. cit., 2001, here p. 381.
- ¹²¹ Porter, *Trust in numbers...*, op. cit., 1996, p. 43.
- ¹²² Woolf, «Statistics...», op. cit., 1989, pp. 597-603.
- ¹²³ Silvana Patriarca, *Numbers and Nationhood. Writing statistics in nineteenth century Italy*, New York, Cambridge University Press, 1996, p. 240.
- ¹²⁴ Maria Fernanda Alegria, *A organização dos transportes em Portugal (1850-1910). As vias e o tráfego*, Lisbon, Centro de Estudos Geográficos, 1990, pp. 44-50; Ana Nogueira da Silva, *O modelo espacial do Estado Moderno. Reorganização territorial em Portugal nos finais do Antigo Regime*, Lisbon, Estampa, 1998, p. 373.
- ¹²⁵ Joaquim Tomas Lobo d'Ávila, «Relatorio do Conselho de Obras Públicas e Minas que acompanhava o plano geral das comunicações do Reino, proposto pelo mesmo Conselho», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, n. 3, March, 1854, pp. 200-218, quote pp. 209-210. This was a difficulty shared by most European countries, such as Spain (see José Ignacio Muro, Francesc Nadal and Luis Urteaga, *Geografía, estadística y catastro en España. 1856-1870*, Barcelona, Ediciones del Serbal, 1996), France (see Gilles Palsky, «Les developpements de la cartographie statistique au XIXe siècle» in AA.VV., *La Cartografia Francesa. 5è Curs du Cicle de conferències sobre Història de la Cartografia*, Barcelona, Institut Cartogràfic de Catalunya, 1996, pp. 149-164, here p. 150) and Italy (see Emmanuela Casti Moreschi, «Cartografia e politica territoriale nella Repubblica de Venezia (secoli XIV-XVIII)» in AA.VV., *La Cartografia Italiana. 3er Curs du Cicle de conferències sobre Història de la Cartografia*, Barcelona, Institut Cartogràfic de Catalunya, 1993, pp. 81-104).
- ¹²⁶ Muro, Nadal and Urteaga, *Geografia...*, op. cit., 1996, p. 7.
- ¹²⁷ Stuart Woolf, *Napoleon's integration of Europe*, London, Routledge, 1991, pp. 83-132.

Part I

To become modern: emergence of modern technologies of
government

(from late *Ancien Régime* to Liberalism)

Cartographic Policies before the «Regeneration»

from the *Carta Topographica do Reino* to the *Carta Chorographica do Reino*
(1788-1852)ⁱ

*Any country that wishes to
reform itself should perforce be
travelled.*

José António de Sá, 1783¹

The idea of a General Map of the Kingdom

The reform bill which, in 1790, re-drew the judicial constituencies («*comarcas*») laid out the foundations of a reforming vision of the territory closely connected to the overall reform of the judicial system.² The application of this law was faced with countless obstacles, amongst which the shortage of technical and scientific knowledge.³ The lack of credible geographic information and the scarcity of human and financial resources blocked the reform. Therefore, demarcation judges («*juízes demarcantes*») were unable to oppose the exactness of calculations to the «impressionistic» arguments of municipalities, for the good reason that there was no reliable General Map of the realm upon which to base those calculations.⁴ Not surprisingly, local elites explored these shortcomings to their own advantage and political profit.

The late *Ancien Régime* territorial make-up rendered the kingdom unmanageable as a consequence of the contractual relationships the Crown had established with the «corporate society».⁵ As a matter of fact, the situation collided head-on with the underlying principle of the new, enlightened political model: rationality *über alles*. The territory hindered the exercise of political power; the way it was organised barred the

ⁱ In order to help follow the narrative, and to have a general overview of historical events, in addition to the footnotes in this Chapter, the reader is directed to the Historical Timeline, in the Annex.

regular administration of justice.⁶ The 1790 judicial reform bill had been intended to reverse the terms of that relation, by turning the territory into an instrument for the exercise of (political, administrative and judicial) state power.⁷

Strongly influenced by the *Lumières*, Portugal was taking on the shape of an *Ancien Régime* state seeking to centralise and «modernise» its outlook. To this end, the administration found it crucial to employ new, more inclusive, more extensive, and more centripetal ways of articulating the centre with the peripheries, opening up channels of «communication/knowledge/administration».⁸ Thus, sovereignty acquired, to the *Ancien Régime* state, a specifically territorial dimension. It was now increasingly important to know, represent and manipulate the territory, the landscape, and the populations, in sum, the things and peoples under its formal jurisdiction.⁹ Theoretically at least, several reforms would attain such a goal: those which produced maps and statistic information¹⁰, redrew municipal and parochial borders, created judicial constituencies, reformed taxes or fostered communications. Territorial management was born, along with specialised policies to put effect it.¹¹

Proper geodetic operations, that is, the «works used to base topographic and cadastral operations, obtained through the delicate processes of geodesy» in order to survey a General Map of the Kingdom began in 1788.¹² I place the decision to survey a General Map in this historical context, and try to understand it from the viewpoint I have just outlined. Cartographic policies are a prototypical instrument of enlightened administration.¹³

In Portugal, terrestrial cartography based upon geodetic measurement acquired from its inception three basic features, to be found thenceforth varying relative weights. Firstly, there is a scientific element, according to which geodetic operations should contribute to the study of Earth's shape. Then, a military one, according to which

geodesy in association with topographic survey responded to essentially military considerations derived from the need to know and defend the territory. Finally, a civilian perspective, linked to the administration's modernising efforts, substantiated in territorial planning and management, direct exercise of sovereignty over a given national territory, tax collection, and networked development of communication infrastructures.¹⁴

A couple of vignettes will briefly illustrate this point. Timoteo Verdier, a student of Portuguese geodesy and statistics, wrote to the then minister of state, the Viscount of Santarém, a letter which captured the civilian rationale behind topographic surveys:

«Your Excellency, by demanding historical-statistical Charts of all the branches of your Ministry, demonstrates a judicious desire to obtain a proper knowledge of what it is Your Excellency administers; but, without a good Map of the Kingdom (Topographic or at least accurately Geographic), how can Your Excellency hope to demarcate territories, jurisdictions, dispose thoroughfares, bridges, channels, and river basins, etc. Your Excellency will no doubt resort to information-gathering, but will the pieces of information be accurate and based upon reason and economy? Will they not be a fruit of ignorance or based in private interest? Thus, Your Excellency will be forced not to adjudicate by yourself and to govern in the manner of your predecessors, who, possessing sizeable and profound knowledge of foreign countries, of their own country, only once every while had a glimpse of Sintra, Mafra, Caldas da Rainha, and Salvaterra de Magos».¹⁵

In essence, the military monopoly of cartographic surveys, exercised either by the Royal Engineering Corps or the General Staff, has an historical explanation linked with the importance of surveys to military activities. In practice, it was the military who produced topographic maps and route surveys.¹⁶ As the ageing general Augusto Xavier Palmeirim once explained:

«From the knowledge and perfecting of topography, no one could or should profit more than the military. Asked to referee combats, and called to the highest councils of the crown where crucial considerations for the defence of the country are

discussed or where the plans for the future of the country are drawn, and for the fate of governments; what opinions, what reasonings, then, could they invoke about such elevated matters; what trust to invest their advice with; if, at a glance, they cannot master the ground where rivers, roads, fortresses, armies, etc. assure the efficacy of their counsels, either offensive or defensive».¹⁷

The integrated topographic and cadastral survey policy

The 1788 jump-start was due to the agency of Luis Pinto de Sousa Coutinho, then minister of Foreign Affairs and War. Francisco António de Ciera, a full professor in the Royal Navy Academy, was called to supervise operations and «to form the General Triangulation of the Kingdom in such a way as to extract the twofold advantage of providing new bases for the theory of the Earth, and most of all to serve as the solid, sole and unquestionable basis for the perfect construction of a Geographic Map of the Kingdom».¹⁸

The concern with territorial and judicial reform was met by the desire to reform the fiscal structure, prompting the idea of combining topographic surveys with geometric parcelled cadastre. To promote that association, the Royal Maritime Society was created in 1798¹⁹, the first institution to which geodetic works were connected, and the first national cartographic authority.²⁰ The Society was divided in two classes: one, in charge of hydrographical charts; the other, supervised the publication of the topographic map of the kingdom, military and hydraulic charts, and «partial charts of the kingdom, deduced from the great chart, after the completion of the latter, in such a way that those partial charts could form the basis of a luminous, accurate and general cadastre of the provinces.»²¹

As a publishing and coordinating institution, the Society left survey tasks to the Engineering Corps. No permanent body of personnel was provided, only a director and two field aides (Carlos Frederico de Caula and Pedro Folque), an ambitious plan, and a

few instruments. Such institutional design was totally unadjusted to the ambitious, if ill-defined, project of surveying a General Map of the kingdom. Nonetheless, it displayed a «modernising» and integrated conception of cartographic, fiscal and communications policies. June 9, 1801, the first attempt to organise in Portugal the geometric cadastre was set up.²² Though short-lived, this latter attempt at reform aimed at the articulation between geodetic networks, topographic surveys, and the geometric cadastre, something which is worth underlining.²³

In short, the geodetic survey would provide rigorous knowledge of the territory and allow participation in the European geodetic community; the close link between geodesy and the survey of a topographic General Map of the kingdom provided both civilian and military administrations, at long last, with an accurate chart of the territory; finally, the interweaving of these surveys with the survey of geometric cadastre, under the direction of an institution working as a *public cartographic authority*, would make it possible to carry out the cartographic information policy itself, giving it coherence, organisation, and resources. This policy, never really put to the test of practice, nor even precisely defined, would pass on to the Liberal period, although subjected to a much more rigorous formulation and specification.ⁱⁱ

Ciera's heritage and the rebirth of 1834-1848

All fieldwork operations were suspended in 1803, as a consequence of D. Rodrigo de Sousa Coutinho's resignation from office in September 8, 1803.²⁴ The reasons behind the suspension remain clouded, although Filipe Folque, Silvestre Ribeiro and Cyrilo

ⁱⁱ The Liberal period began in 1820, with the Liberal Revolution which overthrew the *Ancien Regime* late enlightened absolutism. The regime thus inaugurated was a Constitutional Monarchy, which was ended by the Republican Revolution of 1910. According to one interpretation, which is far from being consensual, the history of the Portuguese nineteenth-century can be perceived as a long, protracted, and frequently violent transition from the Monarchy to the Republic, carried out against the forces which struggled to preserve the half-way between the two. That is to say it was a time of conflict between radicalism and liberalism that resulted in the growing «republicanisation» of the regime.

Machado concur in pointing out jealousy and court intrigue as the main reasons.²⁵ Following the interruption, it was Ciera who kept every paper, without the government ever using or even asking for them. He died on April 6, 1814; a week later, by royal edict, his brother Paulo José Ciera was made responsible for the manuscripts concerning geodesy and telegraphy, and ordered to extract an official note from them, and then hand everything over to the Royal Military Archive. It is, in any case, obvious that, with the court in Brazil, and during the French Invasions and the Peninsular Wars, it would hardly be possible to accomplish any work in the field. The territory was unavailable.ⁱⁱⁱ

After the Liberal Revolution of 1820, civil and military administrations still did not have a general map of the kingdom built according to modern specifications. After the initial thrust, the state of the works was little more than incipient.^{iv}

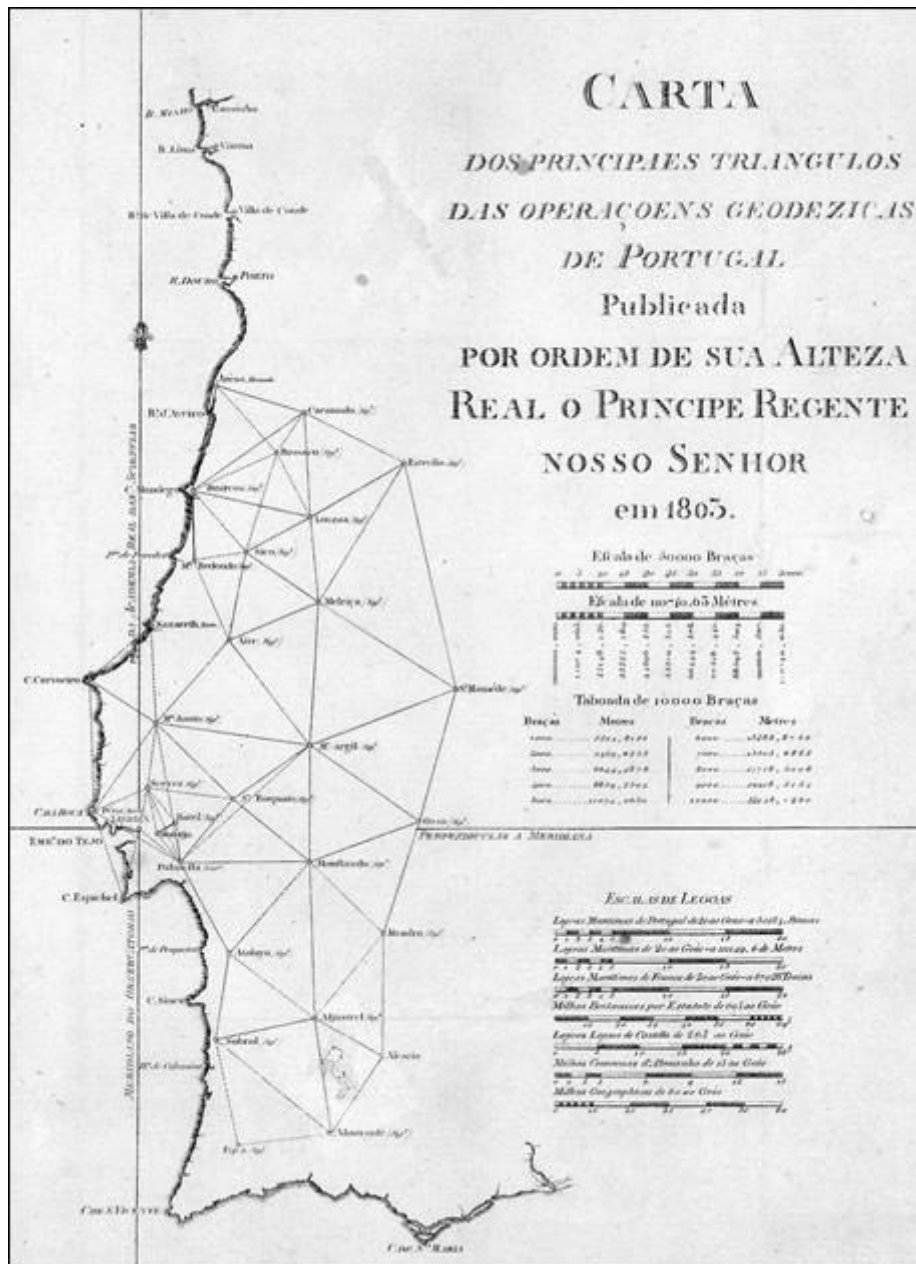
ⁱⁱⁱ Portugal was not immune to the impact of the French Revolution. In the context of Napoleonic expansionism at the beginning of the century, Portugal's international ambiguity, marked by an attempt to seek a compromise between the traditional British alliance and the continental system imposed by the new masters of Europe, dragged the country into the French orbit as a result of three military campaigns (1807-8, 1809, and 1810-1) which not only devastated a substantial part of the territory, but also forced the exile of the court to Rio de Janeiro. This Brazilian city was suddenly transformed into the capital of a trans-oceanic empire. The Braganza dynasty's tropical exile did not prevent Portugal from becoming a battlefield in the war between France and Great Britain. The invading French armies were driven out thanks to British support, which came at the cost of British tutelage until 1820 and which was facilitated by the royal family's fear of returning to Europe. Portugal became, simultaneously, a colony of Brazil and a British protectorate, and was divided into a pro-French party and a pro-British party; the origins of these factions lie, obviously, in the pre-1807 period.

^{iv} On August 24, 1820 some Portuguese military leaders, together with a middle class group which bore the stamp of the freemasons, carried out a liberal and nationalist *pronunciamento* in the city of Oporto with the objectives of freeing the country from the oppressive presence of British officials, forcing King João VI to return from Brazil, and carrying out elections for a Constituent Assembly, charged with drawing up a modern Constitution in accordance with the liberal ideas of the age. This was the dawn of «*Vintismo*» (1820-3). Pre-eminent civilians and military did not allow for the radicalisation of the situation, imposing instead the model provided by the Cadiz Constitution (1812). The Portuguese experience of liberalism did not suffer from a wave of Jacobinism similar to that of France thirty years earlier. The greatest achievement of the Constituent Congress, elected by universal male suffrage at the end of 1820, was the Constitution of 1822, which forced the King to accept a secondary role within the new political regime. The text upheld the principles of national sovereignty, of representation of the Nation, and of the separation of powers, but was from the very start threatened by the tension between the two principles at its core, democracy and monarchy. The evolution of the Portuguese liberal model would thus be hamstrung by reactionary elements loyal to the old absolutist order, who congregated in turn around Queen Carlota Joaquina and Prince Miguel. These carried out the coup of May/June 1823, known in Portugal as the «*Vilafrancada*», with the support of some sections of the army, in order to force the monarch to bring to a halt the workings of the liberal *Cortes* and to abolish the Constitution. The workings of the parliament had opened various wounds in Portuguese society, the most traumatic of which was the parting of ways with Brazil, made inevitable by the return of the King to Lisbon. After the death of João VI in 1826, the Emperor of Brazil – and Portuguese Crown Prince – Pedro IV, attempted to calm the political waters, drafting in Rio de Janeiro a Constitutional Charter, more conservative in tone

As a consequence of the September 12, 1833 and September 13, 1834 ministerial ordinances, geodetic works were restored, under the direction of one of Ciera's original adjuncts, the then brigadier interim commander of the Royal Engineering Corps, Pedro de Sousa Folque, and of Filipe Folque, his son, then captain in the same Corps and director of the Royal Navy Observatory. This *rebirth*, as the young Folque used to call it, would meet endless difficulties and misadventures in order to locate the original instruments and manuscripts. After thorough searches through Ciera's papers, and after adding the latter to Pedro Folque's and general Caula's diaries²⁶, Filipe Folque concluded that «Ciera's Works could not serve as basis, for those works needed to complete the general triangulation of the kingdom, without first being verified and corrected».²⁷ Why? Because the values found for the sides of first-order triangles were mere approximations, because upon measuring the lengthy baseline Buarcos-Monte Redondo an inadmissible error of 685m was found, and because the verification (smaller) baseline Batel-Montijo had been measured only once, and thus did not offer the assurances of exactness required in this kind of work.²⁸

than the Constitution of 1822. This text introduced the «moderating» power of the monarch, a royal veto, a chamber of hereditary peers and indirect elections. Pedro IV (known as Pedro I of Brazil), forced to choose between kingdoms, opted for Brazilian, abdicating the Portuguese throne in favour of his daughter, still a minor, the future Maria II. The regency created to oversee the kingdom was not strong enough to ensure the political stability of Portugal, threatened by the supporters of Prince Miguel, exiled in Vienna. These upholders of royal absolutism took advantage of the situation to create a climate of terror and persecution, which culminated with the Prince's return to Lisbon in 1828, where he was quickly proclaimed King in 1828. This *Miguelista* experience would last until 1834, when, after two years of civil war, the liberal party triumphed. The war was resolved by the convention of Évora-Monte and the exile of the usurper.

Map n. 1



Carta dos

Principaes Triangulos das Operações Geodesicas de Portugal publicada por ordem de Sua Alteza Real o Principe Regente nosso Senhor, 1803.

(Map of the Major Triangles of Geodetic Operations in Portugal published at the command of His Highness the Prince Regent our Master)

Right away, in the beginning of 1835, the verification baseline Batel-Montijo was checked. This was very delicate work, requiring the baseline to be measured twice in opposite directions, and the topographic survey of a land strip in all its extension. From the winter of 1835 on, terrestrial angles and zenithal distances in between the vertices of the extant network were observed. Observations took up the better part of 1836's fieldwork season, until October. Political turmoil began in the winter of 1836 and that, prolonged during 1837^v, made the Board's work extremely difficult: «the state of the kingdom not allowing us to do the excursions across the country which our works greatly needed, we have taken this occasion to begin to give some thrust to the topographic part».²⁹ Thus, the second-order triangulation that extends from Montijo to Cabo da Roca was projected.

Still following the sequence of the revision of Ciera's work, in 1837, a set of observations was carried out allowing a more rigorous determination of the latitude of the St. Jorge's Castle observatory (origin of the geographical coordinates). Once again, the lack of adequate instruments proved to be an important impediment: the Military Archive did not have them and the government could not purchase them. Astronomical observations were done with a repeating circle owned by Folque, and with borrowed pendulum, barometer and thermometer. A new latitude value was determined for the observatory, as well as the azimuth of one of first-order signs, the Bugio lighthouse. Folque commented, on the year 1837: «my comrades and I, charged with this commission, only received three months' pay and gratuity – the way we served, it lays described above; the way we lived, only each one of us knows».³⁰

^v The fragmentation of the liberal «family», driven by ideological differences dating back to the years of exile (1828-1832/34) contributed to the creation of a regime which, if militarily victorious, did not have sufficient authority to impose law and order. The Charter of 1826 was imposed, a fifteen-year old Queen was installed on the throne, and the government was entrusted to the Duke of Palmela and the friends of Pedro IV who had, in the meantime, died. On 9 September 1836 the politicised population of Lisbon and the National Guard carried out a revolution in the capital designed to drive the 'Charterists' from power

Observations in some points of the first-order network continued in 1838.^{vi} Meanwhile, other observations were executed between Lisbon, Cascais and Sintra, in order to decompose the secondary triangulation into lesser order triangles. When the fieldwork season was over, that region was ready to receive topographic survey. By the end of 1838, the government decided to appoint José Manuel Sacoto Galache as head of operations. The Folques were livid. It was then, in 1840, that the crown commissioned Filipe Folque with the writing of a memoir on geodetic works done in Portugal, to be delivered to the Royal Academy of Sciences and subsequently published. This is the well-known memoir, which began to be published in 1841. In 1843, both Folques were reinstated in geodetic works. Because they did not receive any information from Galache as to the works done in the meantime, they decided to take up where they had left off in 1838.

Until 1847, when the passions of the «*Maria da Fonte*» rebellion and subsequent civil war made themselves felt^{vii}, the following agenda was followed: first, to decompose Ciera's huge triangles (see Map n.º. 1) into smaller ones; second, to reject some of those triangles, replacing them with others in better conditions; third, to choose

and force Maria II to restore the Constitution of 1822. This new movement, known as *Setembrismo*, suffered from the impact of constant popular demands, which paralysed its activity in government.

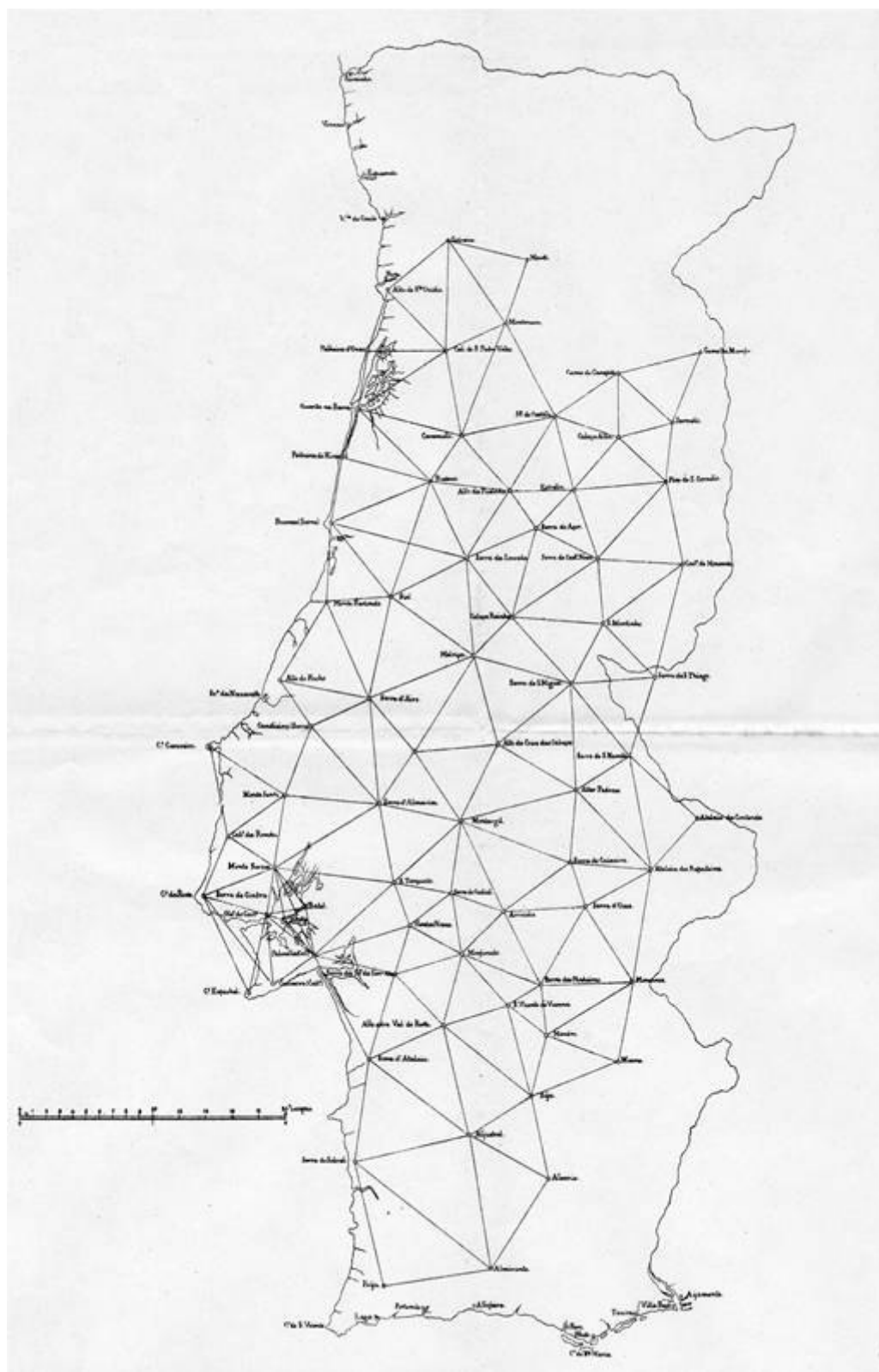
^{vi} The main achievement of *Setembrismo*, the Constitution of 1838, fell halfway between the two previous constitutional texts, but was short-lived. *Order* was restored in the beginning of 1842, with royal approval, by António Bernardo da Costa Cabral, a one-time radical who had fallen for the delights of French doctrinaire politics. A new phase was entered into, during which no recognition was given to the constituent power of the Nation and in which no pacts were made either with the moderate Left, headed by Rodrigo da Fonseca Magalhães and Passos Manuel – the beacons of *Setembrismo* – or the radical Left, entrenched in the political clubs of the capital. The most visible effect of this movement was the restoration of the Charter of 1826 and the holding of elections, which provided Costa Cabral with a disciplined majority, which in turn allowed him to rule with such firmness as to be accused of tyranny.

^{vii} In 1844, the *pronunciamento* of Torres Novas/Almeida, which had intended to return *Setembrismo* to power, was easily crushed by the government. However, two years later, in 1846, the executive was finally forced to resign as a result of a popular revolt, known as the «*Maria da Fonte*», and of the lack of military support within the regime. Incapable of containing the popular revolt, Cabral's government was dismissed by Maria II, who, on the night of 5-6 October, called on the Duke of Saldanha to take charge of the country without informing the chief of government, Terceira, a move later interpreted as a palace coup. Three days later, a Junta was formed in Oporto, which declared its hostility to the new government in Lisbon. The civil war that ensued, known as the war of «*Patuleia*» (*Pautuleia* is a deturpation of *pata-ao-léu*, meaning barefoot, in reference to the popular support enjoyed by the Oporto Junta), was ended in June 1847 thanks to the British diplomatic intervention.

new ground points that, linked to Ciera's old triangulation, would extend it to the North border of the realm; fourth, to determine in each ground point the bearings of every «settlement, object, and notable element, which might be of interest to topography».³¹ It was around this time that the features of the new first-order triangulation (a new chart of this triangulation was built at the scale of 1/500 000, see Map n. 2) and of the *Carta Topographica do Reino* (the topographic chart of the kingdom) were defined (survey scale, publication scale, projection to adopt, topographic conventions to employ, atlas of adjoining sheets).

Topography continued to be surveyed in the Lisbon region, in the terrain between Belém, Caxias, S. Julião, Cascais, Cabo Raso, Alto do Barril, Camarinheiras, Peninha, Pena, Moinho de Albarraque, Cotão, S. Miguel, Alfragide and Ajuda. In 1846, since the «*Maria da Fonte*» rebellion took place in the northern province of Minho, the topographic survey continued in the Sintra ridge and to the north, serving as a practical application course for topography officers. By the year's end, given the peoples' «agitation», it was completely impossible to carry out any fieldwork. Operations came to a complete halt during the 1847 civil war – «we all took up arms» – and only in late 1847 could work be resumed. The winter of 1847 was spent in thorough cabinet work. In the beginning of 1848, the total amount of terrain surveyed at the scale of 1/10 000 came to eight sheets of 0.8m by 0.5m, of which Folque hoped soon to present five.

Map n. 2



Tri

Triangulação Geodésica de Primeira Ordem, ca. 1848 (fac simile)

(First-order geodetic triangulation)

The *Report* of April 3, 1848

As the first order triangulation became concluded, the next geodetic level could now be worked on: large triangles could be «filled in» with lesser-order ones, making use of a technique known as «small geodesy». Only then could topographic survey start. The need to begin the survey of topographic detail was attained, in some areas such as the Lisbon municipality and environs, by the mid 1840's. Thus, actual topographic surveys began there, at the scale of 1/10 000. These surveys would in time be extended to the whole country.³² At that point, director Folque was faced with a double riddle: how to combine topographic survey with geometric cadastre? How to overcome the difficulties mounted by the feeble institutionalisation level of geodetic works and of topography itself as a discipline?

These are extremely important years, in that the mere carrying out of the operational sequence, along with the growing extension of the area to be covered and the functional needs caused by the change in survey scale, brought the Board to a standstill. The hurdles were due to an insufficient degree of institutionalisation: the form in which geodetic works had been organised, the Board *format*, prevented them from working in a orderly and predictable manner. The completion of some first-order triangles, the beginning of second- and lesser-order ones, and the upcoming start of topographic survey posed a set of functional challenges which the minimalist model followed thus far could not accommodate. That is why, faced with them, the model collapsed. In particular, it was necessary to stabilise and augment the yearly budgetary provision in order to pay for the construction of geodetic signs, increase personnel numbers and purchase instruments. Moreover, there was a pressing need to give the Geodetic Board engraving and printing capacity, as well as technical service instructions.

In 1848, the Ministry of War refused payment for some expenses, claiming they were not duly authorised in the ministry's budget. This decision caused all operations to stop, and it is the near cause of a report Filipe Folque sent both Houses of Parliament, on April 3, 1848.³³ The episode which prompted the report was a mere symptom of a more general affliction. In Folque's opinion, the meagre progress of the works thus far had to do with a set of causes. First, it had not been possible to follow «a correct scientific course»; next, there was a «shortage of personnel with proper theoretical and practical skills in the method of work». In a country continuously thrashed by civil upheavals, the quiet, ease and serenity demanded by the scientific mind had also been lacking. Moreover, monies had been scarce and hard-won. The government, while demonstrating a «desire for the continuation of geodetic works, and the formation of the topographic map of the kingdom», «due to an incomprehensible neglect, has continuously forgotten to specify a budgetary allowance, without which it is absurd to expect the operations to have a faster and steadier progress.» Finally, instruments had also been amiss.³⁴ Here, I am concerned with exploring the issue of the «correct scientific course». According to the author:

«The proper order the operations should follow, in order for them to display the most adequate sequence, the necessary resources being available, would be, firstly, to carry out vigorously the first-order triangulation in the whole Kingdom: as soon as some first-order triangles and their levelling were definitely completed, fill them in with second, third, fourth, etc. order ones. Once these operations are concluded, and taking them as base, start the drawing-board work, surveying the cadastral plans at their scales: then, reduce those plans to the scale 1/10 000, depict them on the drawing-boards, and then, at plain sight, draw the terrain's configuration; finally, put the levelling points in the places most convenient. It is clear that from this ensemble of works will result, almost at the same time, the foundations of the real theory of the Earth's shape, the cadastre, and the Topographic Map of the Kingdom. [§] Unfortunately, since the conditions above described have not been provided for, if only in a very limited and precarious manner, and we not being

allowed to carry out cadastral operations, it was necessary to give them another direction altogether, subordinate to the overwhelming strength of circumstances; that is, one did what one could do, and not what one ought to have done.»³⁵

I entitle this idealised sequence of operations *integrated topographic and cadastral survey plan*. This plan provides a clear blueprint for the Topographic Map, the famous General Map of the kingdom. Three features of the programme merit underlining: first, the integrated character of survey operations, connecting, via a single technical and logical sequence, geodesy, topography, and cadastre; then, the fact that it presents as self-evident the link between cadastre and topographic survey, black-boxing the undisputed necessity and economy of their unified survey; finally, the references to the scientific and civilian components of the cartographic model, and the absence of any reference to the military element. Here, the policy adopted in 1788 was spelled out for the first time.³⁶

The Topographic Map was to be modelled on the *Carte de la France*, published at the scale of 1/80 000. Therefore, it would be surveyed at the scale 1/10 000, the same as the French map³⁷, or it would be the result of reducing cadastral plans to that scale. As to engraving, it was considered that, given the «diminutive size of the country», the scale 1/40 000 should be adopted. The sheets would be 0.8m by 0.5m, and the atlas of the Topographic Map would comprehend 192 sheets.³⁸ Because there was no conventionalised system for topographic drawing, a special committee was appointed, which, in 1843, produced completely a new one.³⁹

The Commission of Parcelled Topographic Cadastre

After the frustrated attempt at institutionalisation in 1801, the cadastre resurfaced in the political reform landscape around the mid 1840's.⁴⁰ On October 8, 1846, the government had appointed António José de Ávila to «investigate, collect and co-

ordinate, in the countries most advanced in the science of administration, every work, piece of information or preliminary material, deemed indispensable, necessary, and adapted to the formation and progressive accomplishment of a General Cadastre of the Kingdom». Ávila should follow his study with a report on «the practical application the Cadastre might have with respect to the situation, circumstances, and localities of our country».⁴¹ The government considered cadastre to be an «essential condition, and a crucial basis to help the Administrative Power judiciously and equitably determine and apportion the public tax » and to «give the proper thrust and dynamism needed in every governing decision».⁴² The fruit of Ávila's work was the *Report on the cadastre*, of September, 18, 1847, enlarged and corrected to the August 12, 1848 reprint.⁴³

The espousal of the geometric cadastre had always divided opinions. To some, like Ávila, and to make a long story short, only cadastre would be able to provide a secure basis whereupon to «reorganise the economy», to «advance the agriculture», and, consequently, «to definitely redress the Treasury's unbalance». Others, like Anselmo Vieira, stressed the inconveniences arising from its actual deployment: the many years it took to be surveyed *ipso facto* out-dated it, rendering it obsolete from the moment it was completed; and there was also its huge cost.⁴⁴ In order to overcome those criticisms, Ávila proposed a committee of experts be created to study the reform's application to Portugal, and decided to lay out fieldwork instructions: «Firstly, the measurement of the land (*arpentage*); secondly, the assessment of their production (*expertise*); thirdly, the best system to keep cadastre up to date, so it keeps track of every change in property ownership».⁴⁵ It is in the stage of *arpentage*, the rigorous measurement of land parcels, that cadastral and cartographic projects come together. This point is very clear from the *Report* itself. At the outset, Ávila maintains that the cadastre should not be limited to serve as the base for apportioning direct taxes, and that, apart from being the «immense

plan of the country», it should also provide the country's «property description, the inventory of its productions' worth, and registry of ownership titles». Later on, he goes on to state:

«It is required that the triangles of cadastral plans be in accord with the triangles of the general map, if there is one such general map. In the absence of a general map, there should be, in the first place, the general triangulation of the country, and only then the cadastre, by way of subdividing first-order triangles into smaller ones. Thus, in countries like our own, in which there is no general map, the advantage would be gained of achieving at once the general map and the survey of the cadastral plans.»⁴⁶

The link between topography and cadastre would bring about the transfer of topographic survey operations from the military to the civilian sphere; the rooting of the topographic edifice in geometric cadastre, the General Map being the result of reducing cadastral plans «from the bigger to the smaller»; the notion that, the logical impossibility of an independent course having been established, the integrated survey operations between cadastre and topography could only continue once the *arpentage* stage had begun. However, before that could happen, it was necessary to issue the survey instructions to which both Ávila and Folque refer. Hence, the fate of geometric cadastre became firmly connected to the fate of topographic works: to warrant the execution of one would amount to guaranteeing the execution of the other.

A few days after the reprint of Ávila's *Report*, and explicitly in its wake, the government set up the Commission of Parcelled Topographic Cadastre (*Comissão do Cadastro Parcelar Topográfico do Reino*) in the Ministry of the Interior.⁴⁷ One reads in the decree's preamble that the decision was justified by the need to ameliorate and make more equitable the property tax, and by the simplification of procedure in the launching and collecting of taxes, thus putting an end to the ceaseless quibbles over issues of property ownership. The Commission's functions would be to «prepare the instructions,

operations and expense budgets necessary to measure land parcels, survey cadastral plans, evaluate buildings, and preserve the Cadastre» and to «plan decrees and bills on the actions needed to harmonise our Legislation with the institution of the Cadastre».⁴⁸ The cadastre's «civilian» nature is evident from its goals and from its location in the Ministry of the Interior.

In setting up the Commission, the government seemed to be following the cadastral policy guidelines laid out by Ávila. One of the most important of these established that the cadastre should be parcelled and geometric, built up from topographic surveys, rather than, say, based on declaration, inscription in land registries, and subsequent inspection. If one recalls that the topographic survey was already connected, «upstream», with geodetic networks, one can see unfolding a relational arch linking the various order geodetic networks to the topographic surveys, through to the geometric cadastre.⁴⁹ This is already the result of a rearrangement of the cartographic model's three components, with increased weight given to the civilian element. Indeed, not surprisingly, in October 1848, Folque was all set to proceed immediately to «survey the parcelled plans of the municipalities of Oeiras and Cascais, and part of the municipalities of Sintra and Belas», and to present the «chart in the scale of 1/100 000 showing the triangles that serve as basis for topographic plans already surveyed», plans which he had already presented to the Commission of Topographic Cadastre.⁵⁰ It is understandable, then, that one of the Commission's first decisions was to give first-order triangulation the biggest possible push.

As a result of decisions taken in 1848, the Board's staff was augmented, instruments were bought from abroad, and the budgetary sum was multiplied by five.⁵¹ Additionally, a cost estimate was drafted (in the previously quoted official letter 28-9-1848) for the completion of first- and second-order triangulations. As far as cadastral

works were concerned, there was no previous experience whereupon to base budgetary estimates, as this was the first time such operations were attempted. This official letter was swiftly responded to by ordinance 2-10-1848, which made concluding first-order triangulation a short-term priority, expanded the Board's staff by ten military engineers, and ordered the purchase of instruments and the construction of geodetic signs and field tents.

Still in 1848, the Geodetic Board changed name, to *Geodetic and Topographic Board of the Kingdom*. In early 1849, the Board left the Ministry of War and was relocated in the Ministry of the Interior. The Permanent Commission of Statistics and Cadastre of the Kingdom, headed by Marino Miguel Franzini (and located in the Military Archive) lost the monopoly over cadastre, at the same time the Ministry of War lost hegemony over map-making, a «landslide» defeat for the military's ambitions of controlling base geodesy, cartography, topography, and cadastre.⁵²

Let me, then, state my main argument – and a perplexity. Although the decision to undertake the geometric cadastre is an important fiscal measure, one finds that it triggered profound consequences in the layout of Portuguese cartographic configuration, for two main reasons: the fact that parcelled cadastre is composed of large-scale topographic surveys establishes their unified survey; the kind of technical and financial resources it entails powerfully compels the institutional model to accommodate them; under the pressure of the integrated topographic and cadastral survey plan, the Geodetic Board was forced to grow, stabilise its operation, and crystallize as an administrative and scientific bureaucracy. As we have seen, the April 1848 report pointed towards the same direction. This integrated notion of a technological unity corresponded, in the domain of cartographic policy, to an association between terrestrial cartography and cadastre. The technical link authorised a form of strategic dependence; both translated

into a superordinate relationship, in which cadastre held the strongest pole. How to explain, then, the reasons behind the Topographic Map's dismissal in 1852?

Writing in 1856, Cyrillo Machado does not find in the story he tells any contradiction between the Geodetic Board's main goal in 1856 (the Chorographic Map of the Kingdom) and the one followed up to 1852. In fact, in the years from 1849 to 1852^{viii} there was a complete turnabout in cartographic policy. The author tells us that, from the moment the Commission of Topographic Cadastre was created, «it would probably be *inconvenient* to continue the work on the Topographic Map of the Kingdom at the scale of 1/10 000, because by then it was obvious that the Topographic Map should be a legitimate consequence, and a most easy reduction, of cadastral plans. In those circumstances, the Government very judiciously commanded the survey of the Chorographic Map of the Kingdom at the scale of 1/100 000, one which, though much easier to accomplish, is of the utmost importance for all branches of public administration.»⁵³

As it were, such an outcome would not have been surprising to anyone looking closely at the Geodetic Board. The Board's annual reports from 1848/1849 and 1849/50 show topographic operations had halted, and that, from 1852/53 onwards, they were completely extinct.⁵⁴ Why? On the one hand, the absolute priority given to the completion of first-order triangulation channelled all of the scarce resources available to this task; on the other, considering the close connection between topography and cadastre, it would be counterproductive to go ahead with the topographic map at a

^{viii} Costa Cabral returned to power in 1849, replacing Saldanha, but the defeat of the «Springtime of the nationalities» the year before had rendered redundant the return of the doctrinaires to power. Saldanha pondered revenge for a time, and, once assured that there would be no Spanish reaction to his move, carried out another *pronunciamento* in 1851. The unity of the army being more complete than it had been since 1834, Saldanha became the dominant personality of the time, able to impose his political and social views. The period known as the «Regeneration» began, and a whole new generation entered Parliament and reached positions of power. A wave of enthusiasm for national reconciliation swept the whole country and all political factions, since the constitutional reform of 1852 allowed for changes long demanded by the Left, including direct elections.

moment when the government still pondered what to do with the cadastre. Moreover, the lack of technical instructions on the demarcation of administrative limits brought operations to a standstill, since they should have been made available prior to the start of the actual survey.⁵⁵

The interpretation of this turnabout cannot be reduced to a mere «inconvenience»; this «inconvenience» expressed a compromise, a new ordering of the cartographic model's components; in sum, a fundamental discontinuity.

The heart of the Folque-Franzini polemic of 1850

In writing the memoir he had been charged with, Filipe Folque restrained his historical narrative to geodetic works. He explained the specialization thus: «Concerning the history of the topographic and hydrographic parts no one can write it better, and more soundly, than Mr. Colonel Franzini, as director of the Royal Military Archive, and the author of a beautiful Hydrographic Chart of the Coast of Portugal».⁵⁶ Less than a decade would pass before he became involved in a strident polemic with the same Franzini he then praised.⁵⁷

Charles Bonnet's commission to study the Algarve, in 1846-47, which resulted in his *Description géographique et géologique*, earned the approval of the Royal Academy of Sciences, who decided to publish it.⁵⁸ The generous welcome with which Bonnet's work was met in the Portuguese scientific *milieu* owed much to the association with Franzini's labour, by making use and publicity of a «geographical map extracted and drawn at the scale of 1/200 000, based upon our General Map of the Kingdom of Portugal (yet to be published) that we were so candid as to lend him».⁵⁹ The geographical chart at the scale of 1/400 000 Franzini was preparing was riddled with endless *lacunae* and imprecisions, and, even though Bonnet's work was not strictly a cartographic survey, it allowed Franzini's map to be corrected and «filled in» with

content which it did not yet display.⁶⁰ Franzini's map resulted from an imaginative usage of available cartographic materials: the already triangulated geodetic network, his 1814 hydrographic chart, and, as the main source of topographical content, military reconnaissances and route surveys and other partial charts. It was not based on a systematic survey with geodetic support, carried out from scratch by a specialised corps – that was being done, at least in theory, by Filipe Folque and the Geodetic Board in the Ministry of Interior. It is obvious that, in 1850, Folque's topographical-cadastral «machine» was little more than a dream.

How did Franzini, then, expect to «complete» his map, since Bonnet's study was circumscribed to the Algarve? Bonnet's works were acknowledged to be so useful to the country that «[they] originated a proposed Bill presented to the Legislative Bodies, last April, by which Her Majesty's government was authorized to order their extension to the other provinces of the Kingdom».⁶¹ As a matter of fact, the Lower House discussed and approved, in April 1849, a proposal to grant 3 000\$00 to the geological and mineralogical survey of the realm, to be employed in three to four years. Aside from the work's quality, explicitly acknowledged by the House, the Academy and even Folque, what piqued the government's interest was the celerity with which Bonnet elaborated his *Carte Géographique et Géologique*, hence, the speed with which he might be expected to conclude the remaining provincial charts. «The velocity with which this individual surveyed Algarve's chart, which was presented to the Royal Academy of Sciences, and on which the Academy passed its judgement, favouring it with the highest honour, his geographical chart, and the barometric observations he has taken, having measured the altitudes of more than 200 points, all of this kindles the surest hopes that he will carry on with the same agility [...] perhaps before the current legislative session is over, we shall already have the charts of Alentejo and Estremadura».⁶²

By associating themselves with Bonnet's work, Franzini and the Military Archive, who, one should recall, had lost control over official cartography in 1849, sought to rejoin the fray with an upper hand. Franzini and Bonnet were now legally authorized to extend their activity to the entire country, availing themselves of an appointed geological commission and of a budgetary allowance (10 000\$00 in three years, according to Franzini). The year 1849, the same year Folque-led works almost came to a halt, was spent by Franzini and Bonnet in frenzied activity in scorching Alentejo. Franzini's, Bonnet's, the military's and the civilian administration's interest in having a medium-scaled map had converged to make real the parliament's decision. Franzini's chart, though «provisional», could «satisfy every administrative demand». A chart, which, in any case, «we do not have at the present time, to the great misfortune of the nation.»⁶³

The outcome of this association interested Folque enormously, for it presented itself as a potential competitor to his own great efforts. Franzini took due notice of the point, and made sure to mention it, arousing Folque's wrath. As long as Bonnet limited his work to the Algarve, even if improving Franzini's map insofar as this province was concerned, that was no threat to Folque, quite the opposite. Now, the widening of his activities to the whole country, aided by a specially appointed institution, in association with Franzini's map and, perhaps, with the Military Archive, benefiting from the Academy's and Parliament's favour, enjoying budgeted monies greater than those Folque himself had only enjoyed for a year, at a time when the latter fought to keep his institution alive, and when any diversion of political or economic resources to a project which replicated the one he was already engaged in would prove deadly – now, that was alarming!

Having alluded to the *Carta Topographica* as a «magnificent enterprise», executed «with all perfection and rigour», and to Folque as a «wise engineer», Franzini considers that, «in spite of the great talent and quality of the illustrious leader», «this colossal enterprise cannot be concluded before a great number of years, and enormous expenses, have gone by». In order to conjure up his fears, he invoked the British example. In the United Kingdom, a similar work, albeit at a small scale for topographic purposes, had been sixty uninterrupted years in the making, with enormous expenses, and no more than 4/5 of the survey was complete. Full completion was estimated to require the deployment of four engineering companies, assisted by 800 civilian geometers, with an annual budget of 270 *contos*.^{*} The dreadful conclusion follows: «Being that Portugal's surface is of 3 000 leagues^{*}, it is clear that in order to obtain a similar chart it would take 45 years and a permanent annual allowance of 110 *contos*, this in the supposition that the scale of our chart would be reduced to one-sixth of the British. However, our great financial strictures, and the lack of the numerous staff demanded by the employment of 110 *contos* of annual allowance, will long prove to be insurmountable obstacles.»⁶⁴

Folque's forceful reply, in March 1850, was not long in coming. Writing to «set the matters straight, and undo the ill effects, which may have been instilled in the minds of people less knowledgeable in these matters», Folque waists no time in demolishing Franzini's arguments. In the first place, he clears up a misunderstanding: the scale of 1/62 400 was neither a topographic, nor a cadastral scale, it was the scale of the United Kingdom's geodetic survey. Next, he targets the direct transposition from the English budget to the Portuguese case, with no consideration of the circumstances of each country, or differences in instruments and methods. To Franzini's «reckonings» he

^{*} 1 *conto* = 1 000\$00 or approx. £222 sterling.

opposes «his budget». Folque concludes that the total sum to be expended on the geodetic survey and the topographic chart at the scale of 1/10 000 would amount to 1 559 *contos*, which he compares to the 729 *contos* of Ciera's budget. Franzini's estimate was therefore «monstrous».⁶⁵

Had the works not been interrupted for nearly four decades, had there been since 1790 a yearly budget allowance of 15 *contos*, and had Ciera been more careful – Folque argued – the whole of the multi-layered triangulation and over half of the realm's topography at the scale of 1/10 000 would already have been surveyed. The estimate of the time needed to complete the survey is a function of the number of officers and workmen deployed per year, hence, of the annual expenditure. After contemplating several scenarios, Folque arrives at a total of 24 years. «It is therefore perfectly clear [...] that everything Your Excellency has submitted, in order to make believe, that the time spent in said works would be nearly infinite, that the expense would be in excess of this country's present and future capacities, and that the great number of staff to be employed would discourage the most determinate of wills, is nothing but poetry, soon to be gone from the memory of men».⁶⁶

Folque comes decidedly to the point. Should the geographical chart at the scale of 1/400 000 which Franzini was concocting with Bonnet's help be able to «*satisfy all needs administrative, said Geographical Chart becoming even more important since therein the terrain might be configured as a result of having determined with the barometer the altitudes of a large number of points*», this would have «the tacit consequence that the Geodetic and Topographical Works of the Kingdom be abandoned». Folque starts by objecting to the pretension of a single chart for all administrative requirements, performing the purposes of topographical charts, at a scale

* 1 square league = 25 square kilometres.

which *«all agree is too small for that end»*.⁶⁷ Next, he goes on to erode the bases used by Franzini in constructing the chart: the fact that he used Ciera's incomplete first-order triangulation (*«which goes no further than Serra da Estrela and Caramulo»*), the sides of which were too lengthy – a triangulation so defective Ciera himself spoke of its sides as mere *«approximations»* – and in which the measurement of the major baseline was off by 685m. Moreover, Franzini would make use of a myriad topographic plans, *«of different places in the realm, unfortunately surveyed through various procedures, of arbitrary scale and conventions, configuring the terrain at simple sight using several drawing systems, etc.»*. Furthermore, he criticised the limited number of altitude points determined by barometer; and concluded: *«From all that has been said it follows, that Your Excellency's new Geographical Chart, in light of the bases and method employed in its making, cannot aspire to be but a fair geographical reconnaissance, and no more.»*⁶⁸

Finally, Folque addresses Franzini's timing: *«Your Excellency affecting such incredulity concerning the Geodetic and Topographical Works, it is remarkable that you had not yet made your opinion known in the two previous epochs, in which they were directed by Dr. Ciera and General Folque. Why would Your Excellency spare your statement until this very moment?»* The answer is razor-sharp: *«The immense publicity Your Excellency gave your article, the choice of moment, close to the budget discussion, etc., all of this leads us to believe that Your Excellency seeks to prejudice Houses and Government, as well as public opinion, against the Geodetic and Topographical Works of the Kingdom, so as to bring about the annulment of their budgetary allowance. Will Your Excellency possibly succeed? If so, we do not envy you the glory; the history of the sciences will do you what justice you merit; and we, in the quiet of our office, will grieve for this national infamy.»*⁶⁹

At the turn of the mid-century, the development of geodetic and topographical works was exceedingly fragile, and any setback could prove fatal. The Commission of Cadastre's tardiness in supplying Instructions did not *yet* prevent Folque from feeling sufficiently confident to defend his plan in such a fierce manner. Within 18 months, he would change his mind. Folque's embattled reply betrayed the defence of a position he believed to be under threat. It is our belief that this polemic made him aware of the crucial importance of both cost and deadline for so expensive and protracted a chart as the Topographic.⁷⁰ This issue was further complicated by the inherent risks in the association with the cadastre, which, at the time, was all but paralysing. Finally, the polemic made Folque aware that, counter to the «proper scientific course» though it might be, the administration urgently needed a medium-scale map, district or province-wide, similar to Franzini's map-in-the-making. As it happened, the administration needed both types of maps.⁷¹ Let us bear this in mind while moving along to the next sections.

Changes in the structure of the cartographic model

The property tax and the cadastre

At stake in 1848, when the government seemed to want to implement the geometric cadastre, had been, just as it had in 1846, the reform of the most important direct tax, called «*décima*», particularly, the possibility to isolate from it a specific property tax. This issue was coupled with that of the best method to estimate the direct tax: proportional apportioning (*contribuição de repartição*) or apportioning by quota (*contribuição por quota*)? Within this question, still another had to be considered: if one wanted to collect the tax in a way proportional to wealth, how should that wealth be evaluated? Given the inequities of land registries, geometric cadastre emerged as the

most rigorous answer to this last question. The transparent and scrupulous nature of cadastre would be of extreme political usefulness when the time came to apportion direct taxes. The memory of both the «*Maria da Fonte*» rebellion, triggered by the adoption of the proportional apportioning system of the «*décima*» without the cadastre «underneath», and the 1847 «*Patuleia*» civil war was still vivid.⁷²

Actually, the method used to evaluate taxable wealth is independent from the type of apportioning system one chooses. However, in the context of a disproportionate structure of state's revenues, especially considering the weight of indirect taxes in the overall public revenues, both issues tended to be equated. In the period from 1850-51 to 1890, indirect taxes were the major revenue source (ca. 50% of total revenues); next, were direct taxes, providing for 25%; revenues produced by the «national assets» were on average under 12%, and accounted for less than one tenth part of the total from 1877-78 onwards.⁷³ How to interpret this tributary structure? The fiscal historian Eugénia Mata reckons that «the preponderance of indirect taxes and the diminutive weight of direct taxes are linked to easier tax-collection derived from a relative fiscal numbness and to the fact that it is less demanding in what concerns the setting up and maintenance of administrative and bureaucratic machinery. This feature betrays an archaic and rigid administrative structure».⁷⁴

The weight of indirect taxes points to a fundamental feature of the nineteenth century Portuguese state, its weak infrastructural power, as shown in the preference for indirect taxes.⁷⁵ While considering the topic, Mata starts by quoting Augusto Fuschini's «three rules» of the Portuguese revenue system: «Favour the loan over the tax, that is the first rule [...] because indirect taxes, by their nature and incidence, are less stirring of public opinion, they should be preferred to direct ones, that is the second rule [...] finally, the third rule is constituted by the launching of additional levies».⁷⁶ Going

beyond the «fiscal numbness» argument, Mata submits that such a tributary structure indicates «a state deficiently rooted in the territory over which it exerts sovereignty, thus resorting chiefly to, on the one hand, import duties, compensations from the tobacco monopoly, consumption tributes paid by the city of Lisbon [...]; and, on the other hand, to indirect taxes due to the effortlessness of their collection. In fact, the ability to apply the excise with similar incidence over the whole national territory seems to escape the state.»⁷⁷

Now, this is the point at which geometric cadastre mingles with the General Map. The process of instituting a property tax acutely evinces the state's difficulties in penetrating the territory and, from that viewpoint, illustrates and substantiates Mata's argument above quoted.

In the face of the disproportionate structure of fiscal revenues, governments attempted to reform direct taxes. Even though the geometric cadastre called up a number of other important issues⁷⁸, it had its most «sensitive» application in the property tax.⁷⁹ Other than enabling a rigorous and transparent assessment of taxable wealth, cadastre had the advantage of implying the transition from a quota system to a proportional one.

By mid 1852, the Regeneration cabinet headed by the Duke of Saldanha, and of which Fontes Pereira de Melo was minister of Finance and Rodrigo da Fonseca minister of the Interior, presented to the Houses of Parliament the annual budget of revenues and expenses for the economic year of 1852/53.⁸⁰ The part of the Finance's report devoted to fiscal revenues shows urgency in applying proportional apportioning to direct taxes, because such a system was thought to be the «sole, radical, and truthful medicine». Fontes had no doubt that «while this system is not conveniently employed among us, and, instead of it, we keep on following the pernicious method of quotas, in which all

interested parts, in a way or another, in the alteration of the factual truth, and thus in the immediate ruin of the Public Treasury, there will be endless claims, outrages, law suits, and quarrels between the Treasury and private citizens». Nevertheless, the government did not think the moment was yet ripe to ban the quota system, because there were «powerful circumstances, and even public prejudices, derived from our modern financial and political history, with which the government finds obligatory to compromise for the moment».⁸¹ Fontes was alluding to the «*Patuleia*» civil war, the strawman always usefully brandished when it came to tax reform.

It is clear that the preferred method to *describe, inventory* and *apportion* the direct tax was the geometric cadastre. Unfortunately, it was unavailable. What to do? The minister showed he was aware of the problem: «To be sure, that cadastre [...] will be for a long while a major need, so that the direct and proportional tribute system will be as useful to Portugal as it has been to other nations which have adopted it, and thus witnessed the flourishing of their finances». However, it would not be wise to wait for the conclusion of cadastre to change the whole system of direct taxes.⁸²

The first attempt to isolate a specific property tax from the «*décima*» had been made in April 1845 and had been almost immediately revoked in the context of the «*Maria da Fonte*» rebellion, of May 1846. From 1851 onwards, Saldanha's government was the bearer of a modernising ambition in fiscal policy. When applied to direct taxes, this meant both the dismissal of the quota system in favour of a proportional system and the implied fiscal «specialisation» of the wealth taxable by the «*décima*», that is, the creation of specific proportional taxes on the revenues of «land, capital, and labour». The decree 31-12-1852, partially following these guidelines, created the property tax, leaving aside the two other branches of taxable wealth.⁸³ The property tax was

deliberately created as a proportional apportioning tax and *not* a quota tax⁸⁴, in replacement of a handful of extant taxes.⁸⁵

Still, how to understand that a reform which sought to fight fiscal inequity⁸⁶ relinquished the most powerful means of making equity effective (parcelled cadastre), in favour of the land registry system, notoriously inaccurate, highly prone to local manipulation and that, moreover, did not yet exist? Fontes anticipates the objection: «and do not say that the institution of cadastre is necessary to achieve this momentous purpose; [...] Unfortunately, in Portugal cadastral works are so laggard that to wait for their completion would be tantamount to renouncing the advantages of proportional tax». The provisional land registries to be prepared would later be replaced by «more exact, definitive ones»; land registries, «even if they cannot properly replace a regular and complete cadastre, will sufficiently fulfil their purposes, and will shed light over so many and so important works that have to be carried out, and for which the necessary load of statistical findings is lacking».⁸⁷

The sensitive issue of land registries was one of the causes which explained the resilience of those same vices the property tax reform sought to eliminate. Mata tells us that the first land registries were but rough approximations; that the 1860 land registries, supposedly definitive, were mere expansions of the first, and that, all through the second half of the century, successive reforms which tried to improve land registries came to nought. Thus, it is not surprising to learn that, shortly after the Republican Revolution of 1910, geometric cadastre resurfaced as the preferred method to assess property value.⁸⁸ On the subject of land registries, allow me to quote a very telling intervention by Fradesso da Silveira in the House of Deputies: «The treasury clerk would summon special local informants [...]. The scene took place far from the land parcel, away from the building that was supposed to be described, sometimes 40 km. afar. The clerk would

put his questions to the informant: 'which is, more or less, the income of the property?' The blunders began in the designation of the property's name, and then continued in the designation of the proprietor and of the renter, culminating in the estimation of taxable income. There were blunders from beginning to end, the consequences of which we now suffer. Properties are described in such a way that proprietors, when confronted with the registers, deny their ownership; they do not recognize them due to the manner in which they are described.»⁸⁹

When the property tax bill was discussed in Parliament, Fontes had the chance to defend the proportional apportioning tax against a succession of vocal speakers. One of the anticipated was Fontes' predecessor in Finance, Ávila himself. He started by declaring himself wholly in favour of the proportional method, praising Fontes for showing courage and civic dedication («carrying out a reform which, in 1846, served as pretext to a revolution»). Next, he confided that he also had considered undertaking a similar reform, but in the end had not thought it convenient to go ahead, «as not to expose the party that supported me to a new experience similar to that of 1846».⁹⁰ The fact that Ávila, when in office, had chosen not to apply the proportional method to direct taxes, and the fact that Fontes, when adopting it, had favoured land registries as source of fiscal information, begot the dismissal of the parcelled geometric cadastre.⁹¹

But that is not all there is to it. The demise of geometric cadastre confirms Mata's remarks on the administration's difficulties in exerting fiscal excision. Indeed, the exercise of the state's, or the *centre's*, territorial and fiscal authority was confronted with strong *local* resistances, which the state either did not wish or was not able to overcome. Anselmo Vieira made the same point: «the property cadastre has not yet been carried out due to a false notion of political conveniences, and to the fear of destroying popularity in certain social spheres. The rigorous evaluation of the country's property

wealth will necessarily provoke reactions that will demolish popularity, and the latter is extremely seductive to most politicians».⁹² In the same line, the *Report on the works of the Council of the Cadastre*, authored by Ferreira Martins and Cunha Belém, confirms that to base the property tax on land registries was a choice made *in alternative* to geometric cadastre. Their suggested explanation corroborates my hypothesis: «In spite of the advancement the notion of cadastre received throughout the nineteenth century, intrigue and the might of big landowners, who, reckoning they would be obliged to pay the state an amount proportional to their large territorial domains, destroyed, in cahoots with political caciquism, an idea that was being followed in all Europe. And Portugal was left with no cadastre.»⁹³

Map-making: change and reordering

Ever since 1849, the Board's annual reports had been indicating that topographic operations were slowing down to a standstill. At this juncture, we are ready to understand why: Ávila, who, in office as minister of Finance, and as former chairman of the Topographic Cadastre Commission, was expected to give a decisive push to cadastral operations, never actually did so, because he thought the reform only made sense in articulation with the proportional apportioning direct tax reform which he, for political reasons, did not wish to carry out. The confidential official letter sent by Folque to the minister of the Interior, October 7, 1851 is essential to fully understand the guidelines the former gave to the Board.⁹⁴

Folque starts off by asserting: «it would be inexcusable for the government to order the execution of the Topographic Map of the Kingdom at the scale of 1/10 000 before the Parcelled Topographic Cadastre was complete, considering the easiest deduction of the former from the latter, that would be tantamount to a doubling of

expenses.» If it is possible to construe the Topographic Map from cadastral plans, the contrary is not true. Once the second order triangulations were complete in any given province, the time would then be ripe to «conclude the parcelled plans of parishes, and then to elaborate the topographic plans of municipalities.» Once these were concluded, «and reduced to the scale of 1/50 000 [...] we would obtain the Topographic Maps of Districts, and by again reducing these to the scale 1/100 000, we would obtain the Provincial Maps». Here, once again, was the integrated survey plan spelled out.

Next, Folque considers preliminary works required by the «mathematical part of the parcelled-topographic cadastre»: first and secondary order triangulations, and demarcation of parish and municipality limits. If the first couple of tasks can be said to be independent of any other operation, the third one presupposes that there is already a law demarcating administrative limits, which there was not. In these circumstances, «the provisional demarcation of limits of actual Parishes and Municipalities is of the utmost urgency», so that, keeping them in sight, one can proceed to their final setting. Only then will everything be in place for the beginning of cadastral survey. Folque separates the issue of demarcation of administrative limits from the cadastral survey, that is, if the government cannot begin with the surveys in the municipalities, it should nonetheless proceed to demarcate limits in the municipalities already triangulated, because «the Government can immediately use them in the organisation of a good demarcation law, and in the collecting of many statistical objects, dependent on the knowledge of the superficial dimensions of those Parishes and Municipalities.»

In case the government wishes to definitely let go of any intention to produce a parcelled cadastre, then, correspondingly, it must also abandon the Topographic Map, because the cost of a topographic map executed in the absence of the cadastre is not that much less than that of the cadastre, and because, however rigorous and perfect the

graphic results, the usefulness of such a map would be limited. Indeed, without the parcelled cadastre «underneath», the topographic map in the scale of 1/10 000 could not «provide the necessary elements to evaluate the dimension and quality of the terrain for any property, could not provide with comparable clarity the details necessary for the provisional studies and for the assessment of the indispensable expropriations in order to organise projects for roads, channels, railroads, etc.» Thus, it was obvious to Folque, those «who cannot have Parcelled Cadastre must not want the Topographic Map at the scale of 1/10 000.»

Having determined that the topographic map survey should be carried no further if not associated with cadastre, and, moreover, «not seeing for the moment the possibility that cadastral operations will begin», Folque declares himself «persuaded that, as soon as possible, the government should command the fabrication of a Chorographic Map of the Kingdom at the scale of 1/100 000. In this Map, there should figure prominently water lines and hilltops, and therefore major water basins, enormously facilitating the configuration of all Hills. Furthermore, this Map ought to indicate the location of every village and town, the direction of main roads and thoroughfares, the coastline and the borders, as well as Administrative Districts' and Municipalities' limits. [§] This Chorographic Map is to be surveyed by Administrative District, as secondary triangulations come to be concluded. The importance of this Map for all projects in roads, channels, railroads, demarcation of territorial limits, and other objects of public interest, is so high that no one may doubt its usefulness.» To his mind, «nothing more could therefore be done in following the first and secondary order triangulations except to demarcate the limits of Parishes and Municipalities, so that they may serve as the basis for a good Territorial Demarcation law and to survey of Chorographic Maps of Administrative Districts [...].»

Such an extremely important declaration failed to receive, in the short run, any response. As we have seen, the Finance was still hesitant about the fiscal reform bill's orientation. At the beginning of September 1852, the Geodetic Board was still located in the Interior.⁹⁵ Some time later, Folque wrote a personal note to Rodrigo da Fonseca Magalhães asking, in light of what he had explained in the 7-10-1851 official letter, for «permission to proceed to the demarcation of actual limits of Parishes and Municipalities, as well as to survey their Chorographic Map at the scale of at least 1/100 000, in all municipalities already covered by secondary triangulations.»⁹⁶ The minister acquiesced in the ordinance of September 14, which commanded the survey of a chorographic map of the administrative districts. Meanwhile, the Ministry of Public Works was created by the end of August 1852.⁹⁷ This Ministry was a fundamental instrument in the deployment of the developmental policy followed by the Regeneration regime, to which the *new cartographic policy* was of great importance. The survey of the Chorographic Map was to be detailed in a couple of ordinances in October and November, 1852. Henceforth, official cartography would support the management of the territory and the creation of communication infrastructures, according to the terms Folque had outlined in October 1851; in sum, as an instrument of the «Fontismo».^{ix98}

^{ix} The Regenerationist cabinet (1851-6) went as far as appointing some of the leaders of *Setembrismo* to positions of power within the State apparatus. Cabral went into exile in Spain for a second time in five years and the country embarked on a programme of material development directed by Minister Fontes Pereira de Melo, the most significant political figure of the period. In 1856, King Pedro V, displeased with the governing style of Fontes and his growing unpopularity, charged the Marquis of Loulé with the formation of a new cabinet in order to breathe new life into governmental action. The years that followed, until 1868, were, however, marked by continuous political disorder and successive changes of government.

Notes

¹ José António de Sá, *Compêndio de Observações, que formarão o plano da Viagem Política, e Filosófica, que se deve fazer dentro da Pátria*, Lisbon, Oficina de Francisco Borges de Sousa, 1783.

² Ana Nogueira da Silva, *O modelo espacial do Estado Moderno. Reorganização territorial em Portugal nos finais do Antigo Regime*, Lisbon, Estampa, 1998.

³ Ana Nogueira da Silva, *O modelo...*, op. cit., 1998, pp. 370-372.

⁴ A detailed account of what was meant by the «General Map of the kingdom» (*Carta Geral do reino*) was not provided right away. The label loosely covered the concept of a map surveyed with the support of high precision geodetic networks, at a scale adequate to topographic representation (no smaller than 1/80 000), and eventually to the cadastre (if so, in a much bigger scale). Above all, the map should have been the result of systematic surveys covering the whole of the national territory. To be sure, a detailed definition of the concept of «General Map» was in itself object to historical transformation and controversy, and it constitutes a central element in the institutionalisation process of geodetic cartography in Portugal.

⁵ Luís Espinha da Silveira, *Território e Poder. Nas origens do Estado contemporâneo em Portugal*, Cascais, Patrimonia Historica, 1997, *maxim* pp. 132-133; and Luís Espinha da Silveira, «Estado liberal e centralização: reexame de um tema» in Luís Espinha da Silveira, dir., *Poder central, poder regional, poder local. Uma perspectiva histórica*, Lisbon, Edições Cosmos, 1997, pp. 65-84, here pp. 81-82.

⁶ Ana Nogueira da Silva, *O modelo...*, op. cit., 1998, p. 373. See also António Manuel Hespanha, *As vésperas do Leviathan. Insituições e poder político em Portugal – séc. XVIII*, Coimbra, Almedina, 1994, p. 39.

⁷ See Linda Weiss and John Hobson, *States and Economic Development*, Cambridge, Polity Press, 1995, pp. 1-92; Charles Tilly, *Coercion, Capital, and European States, AD 990-1990*, Oxford, Basil Blackwell, 1990; Norbert Elias, «Processes of State-formation and Nation-building», in AA.VV., *Transactions of the 7th World Congress of Sociology*, Sofia, ISA, 1972, pp. 274-285. For a portrayal of traditional states and modern nation-states, as well as for versions of state formation process, see Michael Mann, *The Sources of Social Power. The rise of classes and nation-states, 1760-1914*, Cambridge, Cambridge University Press, 1995, and «The autonomous power of the state: its origins, mechanisms and results», in John A. Hall, dir., *States in History*, London, Basil Blackwell, 1986, pp. 109-136; see also Anthony Giddens, *The Nation-State and Violence*, Cambridge, Polity Press, 1985, pp. 35-60 and 148-197.

⁸ See Christopher Dandeker, *Surveillance, Power, and Modernity*, Cambridge, Polity Press, 1995, especially pp. 193-227. See also Hespanha, *As vésperas...*, op. cit., 1994, pp. 523-528.

⁹ «Toda una temática existente a partir de la misma aparición del Estado, aunque más abundante y manejable desde un *moderno Estado ilustrado*, en quanto que concibe el *poder* como un proceso de racionalización y concentración, que genera *información* pero que al mismo tempo la quiere y la exige, que tiene *necesidad* de utilizar dichas *averiguaciones* como mecanismo de acertada política, y emplea medios e instrumentos capaces de dar cuenta más eficaz de los objetivos propuestos. Es la idea que transmite el Estado de informarse y de conocer su propio territorio y a sus súbditos para gobernar, para organizar la más útil obra de gobierno, y aplicar directamente las mejoras convenientes que contribuyan a su buen desarrollo y funcionamiento», Miguel Rodríguez Cancho, *La Información y el Estado. La Necesidad de Interrogar a los Gobiernos a finales del Antiguo Regimen*, Cáceres, Servicio de Publicaciones de la Universidad de Extremadura, 1992, p. 138. The overall legal framework changed accordingly: vd. António Manuel Hespanha, *Guiando a Mão de Alice*, Coimbra, Almedina, 2004.

¹⁰ Thinking of the French case, Jacques Revel tells us «the affirmation of an absolute monarchy, backed up by a strong movement of administrative centralisation, constituted another such groundbreaking era in seventeenth and eighteenth centuries. With the state's growing needs requiring a more rigorous hold on the kingdom, the monarchy embarked on a much more intense series of surveys [...] Some were simple censuses, similar to those probably carried out in the sixteenth century. Others were complicated exercises in statistics that produced an intricate grid of information over the territory of France [...] All this is proof that the inventory of resources had become inseparable from the control of a unified area, favoured by both absolutism and mercantilism», in «Knowledge of the territory», *Science in Context*, 4 (1), 1991, pp. 133-161, quote p. 138. See also André Burguière, «La centralisation monarchique et la naissance des sciences sociales. Voyageurs et statisticiens à la recherche de la France à la fin du 18^{ème} siècle», *Annales HSS*, n.1, January-February, 2000, pp. 199-218.

¹¹ See Silva, *O modelo...*, op. cit., 1998, p. 373; Francesc Nadal and Luis Urteaga, «Cartografia y estado: los mapas topográficos nacionales y la estadística territorial en el siglo XIX», *Geo Critica*, 88, July, 1990,

p. 8; and Josef Konvitz, *Cartography in France. Science, engineering and statecraft*, Chicago/London, University of Chicago Press, 1987, p. 43.

¹² Filipe Folque, *Memória...*, op. cit., 1841, p. 7 and José Silvestre Ribeiro, «Trabalhos Geodésicos em Portugal», *História dos Estabelecimentos científicos, literários e artísticos de Portugal nos sucessivos reinados da Monarchia*, vol. II, Lisbon, Tip. Academia Real das Ciências, 1874, p. 141.

¹³ See David Buisseret, dir., *Monarchs, Ministers and Maps. The emergence of cartography as a tool of government in early modern Europe*, Chicago/London, The University of Chicago Press, 1992.

¹⁴ See Michael Mann, *The Sources...*, op. cit., 1995, the chapter «The rise of the modern state IV. The expansion of civilian scope», pp. 479-509.

¹⁵ Cit. in Filipe Folque, *Memória sobre os Trabalhos Geodesicos Executados em Portugal Publicada por Ordem se Sua Majestade*, vol. I., Lisbon, Tip. da Academia Real das Ciências, 1841, p.12. See also José Silvestre Ribeiro, «Trabalhos Geodésicos», in *Historia dos estabelecimentos científicos, litterarios e artisticos de Portugal nos sucessivos reinados da Monarchia*, vol. V, 1876, pp. 288-90.

¹⁶ The Military Historical Archive in Lisbon holds an extensive collection of route surveys, particularly in its 3rd Division, 1st Section. For an example, see *Carta itinerária de Marvão para Fronteira*, s/d., AHM, 3^a Divisão, 1^a Secção, box 37, doc. n. 5. On the construction of these charts, their military importance and function, and their planned compilation into a General Map of the kingdom, see *Observações e advertências para se proceder aos itinerários parciais que têm que ser feitos em diferentes partes do território para servirem depois à redacção da Carta Itinetária Geral do Reino*, s/ a., 1840, AHM, 3^a Divisão, 1^a Secção, box 7, doc. n. 9.

¹⁷ Augusto Xavier Palmeirim, «Memoria sobre a topographia portugueza», *Revista Universal Lisbonense*, 1st series, vol. V, 1846, p. 55. Let us consider the definition of topography and the explanation given to its military usefulness from the viewpoint a military instruction mannual. Bento da Cunha Vianna defines topography as «the art of representing by means of scaling the surface of the terrain, through the employment of drawing and conventional signs, in such a way that through the mere gaze of the plan one can assess distances, distinguish roads, thoroughfares, avenues, rivers [etc.]. From this we can understand how useful and indispensable the knowledge of topography becomes to warfare, both in offense and defence, without this knowledge there can be no strategic arrangements, nor can one wait for a good result from attack, or defence: he who fights over a terrain he does not know, deserves to be defeated; any military officer upon whom a command is trusted must be able to do a reconnaissance, evaluate the position he is told to conquer, and know the battle station he has to defend», in *Curso elementar de estudos para habilitação dos officiaes inferiores do Exercito, acomodado para uso nas escolas regimentaes*, Lisbon, Tip. Sousa Neves, 1859, quote pp. 137-138.

¹⁸ Filipe Folque, *Memória...*, op. cit., 1841, p. 7. On the issue of the General Map of the Kingdom, see Francisco António de Ciera, *Reflecções e plano sobre a Carta do Reino*, s/d., AHM, 3^a Divisão, Arquivo do Conde de Lippe/AML, box 16, doc. n. 7, fls 26. On Ciera's agency, see Humberto Gabriel Mendes, «Francisco António de Ciera. Renovador da cartografia portuguesa», *Geographica*, n. 3, 1965, pp. 11-25.

¹⁹ The *Sociedade Real Marítima para o desenho, gravura, e impressão das cartas hidrográficas, geográficas e militares* was created by decree 30-6-1798.

²⁰ Alegria and Garcia tell us that the setting up of the Society «reveals the preoccupation with the existence of an organism that could supervise the cartographic field». See Maria Fernanda Alegria and João Carlos Garcia, «Evolução da cartografia portuguesa», in Maria Helena Dias, dir., *Os mapas em Portugal*, Lisbon, Cosmos, 1995, p. 72.

²¹ «Sociedade Real Maritima», in José Silvestre Ribeiro, *Historia dos estabelecimentos científicos, litterarios e artisticos de Portugal nos sucessivos reinados da Monarchia*, t. IV, Lisbon, Tip. Academia Real das Ciências, 1875, pp. 157-168, quote p. 161.

²² Decree 9-6-1801. See Mário Silva Falcão, «Contribuição para a história do cadastro geométrico da propriedade rústica em Portugal», *Revista do Instituto Geográfico e Cadastral*, n. 9, 1989, pp. 139-154. The author informs that only a couple of cosmographers were appointed, to Setúbal and Tavira.

²³ José António de Sá, *Instrucções Geraes para se formar o cadastro, ou o mappa arithmetico-politico do Reino, feitas por ordem de Sua Alteza Real o príncipe regente nosso senhor pelo Doutor José Antonio de Sá*, Lisbon, Régia Oficina Tipográfica, 1801 in *Subsídios para a história da estatística em Portugal. Cadastro do Reino 1801-1812*, Lisbon, INE, 1945. The transformations undergone in the uses of cadastral maps were thus described: «Beginning in the sixteenth and seventeenth centuries, there was a fundamental shift in the development of cadastral maps from their use as inventories of private land toward their use by public authorities and ultimately state governments. They were used initially as instruments to effect specific measures, notably tax reform, but ultimately become more general tools for the accurate recording of information relating to individual land parcels. That the cadastral map was by the nineteenth century a widespread and widely valued instrument of government land management is

well attested. What is less well known is that in the early modern period the cadastre was a highly contentious instrument for the extension and consolidation of power, not just of the propertied individual, but of the nation-state and of the capitalist system that underlies it», in Roger Kain and Elizabeth Baigent, *The Cadastral Map in the Service of the State. A History of Property Mapping*, Chicago, University of Chicago Press, 1992, p. 8.

²⁴ For an account of fieldwork activities between 1788 and 1803 (mainly first-order network), see Rui Miguel Branco, *O Mapa de Portugal*, Lisbon, Livros Horizonte, 2003, pp. 87-89 and 127-130.

²⁵ Filipe Folque, *Memória...*, op. cit., 1841, p. 7; José Silvestre Ribeiro, «Trabalhos Geodésicos em Portugal...», tomo IV, 1875, pp. 216-221; Cyrillo Machado, «Uma Visita a um estabelecimento importante», *Diário do Governo*, n. 207, 2-9-1856, p. 1323.

²⁶ See Filipe Folque, *Memória...*, op. cit., 1841, pp. 15-16. Ciera's manuscript diaries from the 1790-91 reconnaissance can be found in *Arquivo do Conde de Lippe*, AHM, box n. 16, doc. n. 21.

²⁷ Filipe Folque, «Trabalhos geodésicos do Reino. Relatório», *Revista Universal Lisbonense*, n. 26, t. VII, 1848, p. 302.

²⁸ António José de Ávila Jr., *A Nova Carta Chorographica de Portugal*, vol. I., Lisbon, Tip. da Academia Real das Ciências, 1909, p. 9.

²⁹ Filipe Folque, «Trabalhos geodésicos...», op. cit., 1848, p. 303.

³⁰ Filipe Folque, «Trabalhos geodésicos...», op. cit., 1848, p. 303.

³¹ Filipe Folque, «Trabalhos geodésicos...», op. cit., 1848, p. 304.

³² Indeed, sheets of the Topographic Map at the scale of 1/10 000 were produced, as, for example, the sheet covering the municipality of Oeiras, near Lisbon. See «Planta nº 14 da Carta Geral do Reino (Oeiras)» in Mendes, «Francisco...», op. cit., 1965, p. 23. On the various surveys of Lisbon, complete with archival references, see Augusto Vieira da Silva, *Notícia histórica sobre o levantamento da Planta Topographica de Lisboa*, Lisbon, Tip. Comércio, 1914.

³³ Filipe Folque, «Trabalhos geodesicos...», op. cit., 1848, pp. 301-306 and 314-316.

³⁴ *Idem*, pp. 314-316.

³⁵ *Idem*, p. 314.

³⁶ Administrative conceptions stressing the importance of large scale maps and reformist visions of fiscality willing to collect direct taxes on property and to apportion more equitably territorially based taxes were becoming increasingly popular with European governments. Both merged in the idea of the parcelled cadastre supported by the survey of geodetic networks. See Nadal and Urteaga, «Cartografia y Estado...», op. cit., 1990, p. 15, and Juan Pro Ruiz, *Estado, geometría y propiedad. Los orígenes del catastro en España (1715-1941)*, Madrid, Ministerio de Hacienda, 1992.

³⁷ Page 305 of the 1848-report reads: «Bearing in mind that at the scale of 1/10 000 everything of interest to the administration of the kingdom and to the science of war can be represented clearly; this is why the topography of the country is being surveyed at this same scale». On the *Carte de France*, Josef Konvitz, apart from op. cit., 1987, see «The nation-state, Paris and cartography in the 18th and 19th century France», *Journal of Historical Geography*, 16, 1990, pp. 3-16; see also Monique Pelletier, *La Carte de Cassini. L'extraordinaire aventure de la Carte de France*, Paris, Presses de l'École Nationale des Ponts et Chaussées, 1990.

³⁸ An important archival fund on the Topographic Map and on the military topographic and geodetic operations in the first half of the nineteenth century can be found in the Military Historical Archive, 3rd Division, 1st Section, «Carta Topographica do Reino», boxes n. 7, 17 and 21, 33 ms. docs.

³⁹ See *Sistema geral de escalas, de convenções e de desenho topográfico para servir de norma nos trabalhos da Carta do Reino*, ms., 1844, AHM, 3^a Divisão, 1^a Secção, caixa 21, doc. n. 13.

⁴⁰ To be accurate, in 1836, by ministerial ordinance of September 29, the Permanent Commission of Statistics and Cadastre of the Kingdom, headed by Marino Miguel Franzini, had been created in the Military Archive. This Commission mainly worked in the field of territorial statistics. From 1848 onwards, it had no rule over cadastre, and was exclusively dedicated to the production of statistical information for the Ministry of the Interior. See the archival fund «Comissão de Estatística e Cadastro do Reino» in the Historical Archive of the Ministry of Public Works.

⁴¹ *Nomeação da Comissão do Cadastro*, ms., IAN/TT, Arquivo do MR, 3^a Direcção, 2^a Repartição, Lv. 6., n. 712.

⁴² *Nomeação da Comissão do Cadastro*, doc. cit. See Kain and Baigent, *The cadastral map...* op. cit., 1992, especially «The uses of cadastral maps», pp. 332-342; according to the authors, by the nineteenth century, «the cadastral map was an established, if not axiomatic, adjunct to effective government monitoring and control of land», quote p. xvii.

⁴³ I am making use of António José de Ávila, *Relatório sobre o cadastro* in the 1848 edition, reprinted in *Boletim da DGCI*, série A, nº 51, 1963, pp. 777-873. On this commission, and this epoch in Ávila's life,

see José Miguel Sardica, *Duque de Ávila e Bolama. Biografia*, Lisbon, Dom Quixote/Assembleia da República, 2005, here pp. 264-268.

⁴⁴ Anselmo Vieira, *A questão fiscal e as finanças publicas portuguesas*, Lisbon, Ferreira & Oliveira Lda., 1905, particularly the chapter «O cadastro», pp. 241-262.

⁴⁵ António José de Ávila, *Relatório sobre o cadastro*, op. cit., [1848], p. 790.

⁴⁶ *Idem*, p. 794.

⁴⁷ Ministerial ordinance 30-8-1848, *Diário do Governo*, 7-9-1848. The creation of this Commission used a legislative authorization included in art. 50, bill 26-8-1848 (budget for the economic year 1848-49). Art. 50 reads: «The Government will immediately adopt the measures needed to begin the cadastral operations in the Kingdom, in order to serve as the basis for the apportioning of the direct Tax [...]»

⁴⁸ Ministerial ordinance, 30-8-1848. The Commission was headed by António José de Ávila and composed of the following members: Fontes Pereira de Melo, Filipe Folque, Augusto Xavier Palmeirim and Francisco da Silva Ferrão.

⁴⁹ This relational nexus, once put into practice, would constitute a powerful cartographic information factory, anticipating the Spanish model resulting from the *Ley de Medicion del Territorio* of 1859. On this topic, see Jose Ignácio Muro, Francesc Nadal and Luis Urteaga, *Estadística y catastro en España. 1856-1870*, Barcelona, Ediciones del Serbal, 1996, pp. 29-32 and pp. 100-150; and Jose Ignácio Muro, Francesc Nadal and Luis Urteaga, «La Ley de Medición del Territorio de 1859 y sus repercusiones cartográficas», *Estudios Geograficos*, LIX, n. 231, 1998, pp. 311-337.

⁵⁰ António José de Ávila to the Duke of Saldanha, ms., 28-9-1848, IAN/TT, Arquivo MR, Lv. 6º, nº 712, «Comissão do Cadastro ponderando a conveniencia de se ultimar o levantamento da Carta Geral do Reino, propõe o aumento do pessoal da Comissão Geodesica, a compra de instrumentos, e a Construção de Barracas e Pyramides».

⁵¹ The first yearly provision came from the general budget of revenues and expenses in 1848-49, and amounts to 2 500\$00; the 1849-50 provision, already in the Ministry of the Interior, was 11 462\$00. See José Silvestre Ribeiro, op. cit., vol. IX, 1881, p. 50 and Cyrillo Machado, «Uma visita...», op. cit., 1856, p. 1323.

⁵² For a description of the troubled period following the transition of the Geodetic Board from the Ministry of War to the Ministry of the Interior, see Filipe Folque, *Memória...*, op. cit., vol. IV, 1841-1852, pp. 659-667.

⁵³ Cyrillo Machado, «Uma visita...», op. cit., 1856, p. 1323 (emphasis mine). Authors such as Silvestre Ribeiro totally ignore the discontinuity between the two policies: see José Silvestre Ribeiro, op. cit., vol. IX, 1881, pp. 47-53.

⁵⁴ Filipe Folque, *Relatório 1849 a 1850; Relatório de 1850 a 1851; Relatório de 1852*, ms. docs. in briefcase «Relatórios 1849-1865», Comissão Geodésica e Topográfica do Reino, 1849-1852, AHIPCC.

⁵⁵ Filipe Folque, *Relatório de 1849 a 1850*, ms., «Relatórios 1849-1865», pp. xi-xv, AHIPCC.

⁵⁶ Filipe Folque, *Memória...*, op. cit., 1841, p. 16.

⁵⁷ The body of this polemic is constituted by a series of articles published in the *Revista Universal Lisbonense*, namely: from Marino Miguel Franzini, «Estudos geográficos e geológicos acerca do Algarve», *Revista Universal Lisbonense*, t. I, n. 14, 1849, pp. 157-159; «Notícia acerca dos trabalhos da Comissão Geológica de Mr. Charles Bonnet à província do Alentejo em 1849», *Revista Universal Lisbonense*, t. II, n. 20, 1850, pp. 230-232; «Breves reflexões sobre um folheto do Sr. F. Folque, que tem por título ‘Trabalhos geodésicos e topográficos do Reino’ » *Revista Universal Lisbonense*, t. II, 1850, n. 29, pp. 341-343; and from Filipe Folque, «Varias reflexões a um artigo do Sr. Coronel Marino Miguel Franzini sobre os trabalhos geodesicos e topographicos do reino», *Revista Universal Lisbonense*, t. II, n. 27 and 28, 1850, pp. 317-321 and 331-333.

⁵⁸ Charles Bonnet, *Algarve. Description géographique et géologique de cette province*, 1850, here p. 1.

⁵⁹ Franzini, «Estudos geográficos...», op. cit., 1849, p. 158.

⁶⁰ This procedure is admitted by Franzini. The Geological Commission, according to Franzini's own instructions, «examines, and amends, the General Map of Portugal, that I had long been coordinating at the scale 1/400 000, yet to be published, and that in spite of all my toils it still contains immense *lacunae*, and uncertainties, especially in the course of rivers and in the running of hills», in Franzini, «Notícia...», op. cit., 1850, p. 231.

⁶¹ Franzini, «Notícia...», op. cit., 1850, p. 230. See bill 30-4-1849, *Diário do Governo*, n. 104, 1849.

⁶² Speech by the Count of Tomar, *Diário da Câmara dos Deputados*, session 16-4-1849, p. 165.

⁶³ Franzini, «Notícia...», op. cit., 1850, p. 231.

⁶⁴ Franzini, «Notícia...», op. cit., 1850, p. 231.

⁶⁵ Folque, «Várias reflexões a um artigo...», op. cit., 1850, pp. 318-329.

⁶⁶ Folque, «Várias reflexões a um artigo...», op. cit., 1850, p. 321.

⁶⁷ Folque, «Várias reflexões a um artigo...», op. cit., 1850, p. 331 (emphasis in the original).

⁶⁸ Folque, «Várias reflexões a um artigo...», op. cit., 1850, p. 332.

⁶⁹ Folque, «Várias reflexões a um artigo...», op. cit., 1850, p. 333.

⁷⁰ For an altogether different interpretation of this polemic, see Maria de Fátima Nunes, *O Liberalismo Português: ideários e ciências. O universo de Marino Miguel Franzini (1800-1860)*, Lisbon, 1988, pp. 232-235.

⁷¹ Cf. Adelino Paes Clemente, «O cadastro geométrico da propriedade rústica do país», *Boletim do Instituto Geográfico e Cadastral*, vol. IV, 1960, p. 18.

⁷² Ávila, minister of Finance in the second Costa Cabral administration (1848-1851) shows a complete awareness of this point in his *Report on the cadastre*: «because the true system of a country's finances cannot be reduced to properly collecting taxes, and making them produce the largest possible amount with the smallest sacrifice for the tax-payer: it is also necessary that it make obvious to the country, by means of a clear and organised accountancy, what the nation's true resources are, and that the sacrifices that have been asked of her were not wasted in useless expenses. No institution contributes directly or indirectly as much to that effect as a good cadastre» (emphasis mine), in Ávila, *Relatório sobre o cadastro*, op. cit., 1848, p. 796. In the first Costa Cabral government (1842-1846), the planned introduction of the cadastre showed a «clearly defined desire for order and tributary realism», within the context of a certain increase in fiscal pressure. For a characterisation of Cabral's governments, of the «*Maria da Fonte*» rebellion (supposedly triggered by the launching of new taxes to finance public works, the beginning of cadastral operations, and the «health Bill»), and of the «*Patuleia*» (1847 civil war), see Manuel Villaverde Cabral, *O desenvolvimento do capitalismo em Portugal no século XIX*, Lisbon, A Regra do Jogo, 1976, pp. 126-151, *maxim* pp. 126 and 134-138; Damião Peres and Eleutério Cerdeira, dirs., *História de Portugal. Quinta Época (1816-1918)*, vol. VII, Barcelos, Portucalense Editora, chapter «Da restauração da Carta Constitucional à 'Regeneração'», pp. 281-320; Maria de Fátima Bonifácio, «O século XIX em perspectiva política (1807-1890)», in Maria de Fátima Bonifácio, *Apologia da história política*, Lisbon, Quetzal, 1999, pp. 133-208, especially pp. 174-175; and Joaquim Oliveira Martins, *Portugal contemporâneo*, vol. II, Lisbon, Guimarães Editores, 1996, pp. 149-159.

⁷³ Maria Eugénia Mata, *As finanças públicas portuguesas da Regeneração à I República*, mimeo., Ph.D. dissertation, Lisbon, ISEG/UTL, 1985, pp. 61-73; Maria Eugénia Mata, *As finanças públicas portuguesas da Regeneração à I República*, Lisbon, Banco de Portugal, 1993, pp. 131-147; and David Justino, «Fontismo: o impossível livre-câmbio», *Revista de História Económica e Social*, n. 23, May-August, 1988, pp. 3-19.

⁷⁴ Mata, *As finanças...*, op. cit., 1985, pp. 61-63.

⁷⁵ See Mann, *The Sources of Social Power...*, op. cit., 1995, chapter «The rise of the modern state I: Quantitative Data», pp. 358-401, especially the section on state revenues, in which the author demonstrates that this pattern was not at all exceptional in the countries he studies. On the diminutive weight of direct taxes, he comments: «all state elites were deeply embedded in their landowning classes and could not easily wriggle free of their control on an issue that affected so directly their economic interests» (p. 380).

⁷⁶ Augusto de Fuschini, *O presente e o futuro de Portugal*, Lisbon, C.^a Tipográfica, 1899, cit. in Mata, *As finanças...*, op. cit., 1985, p. 68.

⁷⁷ Mata, *As finanças...*, op. cit., 1985, p. 69.

⁷⁸ See, for instance, the polemic debate on whether or not the cadastre should serve as land ownership title, the subject of extensive analysis in Francisco António da Silva Ferrão, *O Cadastro e a Propriedade Predial*, Lisboa, 1849 (reprinted in the *Boletim da DGCI*, series A, n. 52, April, 1863, pp. 1207-1268). Anselmo Vieira is a strong supporter of Ferrão's views, see Anselmo Vieira, op. cit., 1905, pp. 245-246. For a comment on Ferrão's report, see Luiz Augusto Ferreira Martins and João da Cunha Bellem, «Relatório dos trabalhos do Conselho do Cadastro», Lisbon, 1929, separately published in Adelino Paes Clemente, «O cadastro geométrico da propriedade rústica do país», *Boletim do Instituto Geográfico e Cadastral*, vol. IV, 1960, pp. 195-196.

⁷⁹ Ávila, *Relatório sobre o cadastro*, op. cit., 1848, pp. 794-796.

⁸⁰ In what follows I will use *Relatório do Ministerio da Fazenda anexo ao Orçamento da Receita e da Despesa para 1852-53*, 19-6-1852, published as a supplement to the *Diário da Câmara dos Deputados*, Lisbon, Imprensa Nacional, vol. V, 1852 (June).

⁸¹ *Relatório do Ministerio da Fazenda anexo ao Orçamento da Receita e da Despesa para 1852-53*, p. 5.

⁸² Still, it would be helpful to carry out a rehearsal to confirm the so-called advantages of the cadastre. To this end, the government commanded the cadastral survey of the municipality of Oeiras, in order to obtain «a practical result that can confirm, to the mind of the incredulous and inexperienced, the good principles», in *idem*, p. 6. It is very interesting to note that in the report by the Ministry of Interior

(location of the Geodetic Board until 1852) the information given on geodetic and topographic works already conveyed a new guideline, one that, as we shall see, came from October 1851: geodetic works («high» and «small» geodesy) continued in the Estremadura and Alentejo, «where a great extension of terrain is already triangulated, and covered with minute triangles, ready for any parcelled cadastre or topographic operation, etc., *how easy it is now to proceed to demarcate the Parishes and Municipalities to form the basis for territorial demarcation, and for the survey of the chorographic maps of the Administrative Districts*» (emphasis mine), *idem*, p. 7.

⁸³ Decree 31-12-1852 and annexed report, *Diário do Governo*, n. 2, 3-1-1853. On the complete reversal of the fiscal doctrine established only a few months earlier, Fontes comments: «It is not a reason of order, or regularity, or perfection, that should command the mind in such important matters; there are more important and momentous considerations that compel the government to sacrifice the beauty of the system to the practical utility of the results».

⁸⁴ On the topic of proportional apportioning *versus* quota apportioning of direct taxes, see Maria Eugénia Mata, «A contribuição predial, contribuição de repartição ou contribuição por quota», *Revista de História Económica e Social*, n. 23, 1988, pp. 115-131.

⁸⁵ For further details, see Mata, *As finanças...*, op. cit., 1993, pp.146-147; Maria Eugénia Mata and Nuno Valério, *História Económica de Portugal. Uma perspectiva global*, Lisbon, Presença, 1994, pp 125-160; and Mata, *As finanças...*, op. cit., 1985, p. 72.

⁸⁶ «The proportional system is the more advantageous, the more equitable and fair, and the less vexing for the peoples; it is the one which will protect the weak against the powerful [...] and no longer will it be as it was as thus far, when the apportioning was done by the powerful, to their will, and their advantage; while the weak pay all, or nearly all, and the powerful pay nothing, or almost nothing», minister of Finance's speech (Fontes Pereira de Melo) in Parliament, *Diário da Câmara dos Deputados*, session 23-2-1853, p. 166.

⁸⁷ Report of the decree 31-12-1852. Fontes alludes to the example of other countries, such as France or Spain, in which the proportional apportioning tax had been decreed in the absence of the parcelled cadastre. In Spain, from 1859 onwards, when the formation of the cadastre was decided, the main purpose was to fight the extant apportioning system called *amillaramiento*, in effect since 1850. The *amillaramiento* consisted of a nominal inventory of properties in each municipality, in which the land parcels of each proprietor were described, indicating the use of the soil, the extension of the parcel, the net production and the collectable or due tax. In practice, the *amillaramientos* were manipulated by local oligarchies who controlled the *ayuntamientos*, and were charged with providing the fiscal information. Several voices advanced the idea of the cadastre as a way to overcome the unfairness, occultation, and inaccuracy of the system. See Muro, Nadal and Urteaga, *Estadística y catastro...*, op. cit., 1996, pp. 77-82.

⁸⁸ Mata, *As finanças...*, op. cit., 1993, p. 147. Just after the Revolution, in 1911, the members of parliament Brito Camacho and José Relvas presented a project for a bill organising the cadastre.

⁸⁹ Anselmo Vieira, *A questão fiscal e as finanças portuguesas*, Lisbon, Ferreira e Oliveira Lda., 1905, chapter «Contribuição predial», pp. 125-154, quote p. 131. The influential historian Oliveira Martins was very critical of land registries, favouring a municipal cadastre of growth masses. See J. P. Oliveira Martins, «Os Impostos», in *A Província*, Lisbon, Guimarães Editores, 1958 (1885-1887), article of 19-3-1886, vol. III, pp. 203-206. The Geodetic Board itself would be critical of land registries as a reliable source of geographic, judicial and fiscal information, in the context of the demarcation of limits between municipalities. See «Trabalhos geodesicos, topographicos, hydrographicos e geologicos do reino executados durante o anno de 1871. Relatorio da Direcção-Geral», *Revista de Obras Públicas e Minas*, tomo IV, n. 38, 1873 (February), p. 61.

⁹⁰ Speech of António José de Ávila, *Diário da Câmara dos Deputados*, session 28-2-1853, pp. 233-235.

⁹¹ The Regeneration regime, under the banner of a vast «political reconciliation of land-owning classes and their enlargement to the new middle classes», sought to maintain a social basis as large as possible within the social sectors that supported the regime. To do so, the regime limited the use of fiscal pressure, namely against property income. In this interpretative connection, the demise of the cadastre – epitome of «fiscal pressure» – is not really that surprising. See Manuel Villaverde Cabral, op. cit., 1976, section «Os caracteres da Regeneração», pp. 163-165 and p. 177; see also, from the same author, *Portugal na alvorada do século XX*, Lisbon, A Regra do Jogo, 1979, pp. 7-46, quote p. 35; Bonifácio, «O século XIX...», op. cit., pp. 187-191; and Justino, *A formação...*, op. cit., 1988, p. 19.

⁹² Vieira, *A questão fiscal...*, op. cit., 1905, p. 260.

⁹³ Martins and Belém, «Relatório dos trabalhos do Conselho do Cadastro...», op. cit., 1929, quote p. 198. On the Spanish case, see Nadal and Urteaga, «Cartografia y estado...», op. cit., 1990, pp. 58-59.

⁹⁴ Filipe Folque to the minister of the Interior, ms., 7-10-1851, AHMOP, DGOP 10 – RT, doc. n. 55. This official letter will be the source of all of the following paragraphs' quotes.

⁹⁵ The transfer of the Geodetic Board's documentation concerning the period 1848-1851 from the Ministry of the Interior to the Ministry of Public Works is dated from 9-12-1852. See «Relação dos papéis pertencentes á Comissão dos Trabalhos Geodésicos e Topográficos», IAN/TT, Arquivo do MR, 3^a Divisão, 2^a Repartição, n^o 712.

⁹⁶ Personal note from Filipe Folque to the minister of the Interior Rodrigo da Fonseca Magalhães, ms., 10-9-1852, IAN/TT, Arquivo MR, 3^a Divisão, 2^a Repartição, Lv. 9^o, n^o 782.

⁹⁷ Decree 30-8-1852; the Ministry was organized and regulated by decree 30-9-1852.

⁹⁸ On the issue of «fontismo», see Maria Eugénia Mata, «As três fases do fontismo: projectos e realizações» in AA.VV., *Estudos e ensaios em homenagem a Vitorino Magalhães Godinho*, Lisbon, Sá da Costa Ediora, 1988, pp. 413-431, especially pp. 417 and 419-420; and Rui Ramos, «O sistema fontista» in António Reis, dir., *Portugal Contemporâneo*, vol. II, Lisbon, Publicações Alfa, 1990, pp. 125-146.

The Metric failure

Portuguese weights and measures from late *Ancien Régime* to Liberalism

Therefore, *your excellencies the Judges, you may
repair, plaster and paint, the Pillory to your
Lordships content, but do not change its
whereabouts, and much less to a place unknown
to the People.*

Timóteo Verdier, 1819¹

The invention of the metre: towards «*la France une et indivisible*»

Even before the Revolution had gained the day, uniformity already enjoyed, in France, the status of key conceptual tool in the thinking of the *philosophes*. Dreams of uniformity, in measures as in society, echoed justice and rationality. They were seen as an aspect of a deeper political and philosophical stance. Just as nature's laws were everywhere the same, the Babel of human habit and custom should be sorted according to universal and scientific principles. Only the inherently truthful and universal character of such principles would render them comprehensible to all, thus curtailing the unjust advantage of the powerful over the powerless. From very early on, every major theme of political economy was contained within the debate on the reform of weights and measures: *de facto* equality of rights and freedom would hinge upon it.

Ken Alder stressed that at the core of France's universal metric measures laid the historically contingent, *not* the outcome of objective science. That the latter assumption is so commonly held today is perhaps the best tribute to the metre's success. The metre has been successfully naturalized in the everyday social life of Europeans (the British excepted). Alder demonstrates how these seemingly «natural» standards actually conveyed the particular agendas of social and economic interests. During the French revolutionary period, a technocratic elite used the new measuring system to try

and mediate a fundamental tension between asserting state authority and building a nationwide market economy. Here was a rational language *deliberately crafted* to break the mould of *Ancien Régime*'s political economy, whilst posing as the Esperanto of modern trade. At the heart of the liberating rhetoric lurked a contradiction. The short-circuiting of particularistic interests and «liberties», underpinned by the principles of Reason and Liberty, was expected to bring about the downfall of traditional French society. To do that was tantamount to appointing Reason as the «sole despot of the universe». The distinctive intonation of authoritarian rhetoric followed, only to be powerfully amplified by the Revolution.²

«One Law, One King, One Weight, and One Measure»

The rhetoric put forward to support the espousal of a uniform system blended physiocratic, economic and progressive, revolutionary arguments. As one representative to the National Assembly put it in 1790, the system would increase exchanges between distant parts of the nation. It would put an end to the wasteful and fraudulent practices of merchants who purchased a commodity at a large measure and then sold it at a smaller one, and, by enabling the comparison of yields from different land parcels, it would enhance productivity in the very source of national prosperity, agriculture. In the *Ancien Régime*, the primary impetus for the spread of uniform measures came from the transforming economy. Parisian measures were gaining ground, not nationwide, but in major urban areas (with which the capital had increasingly intense trade). In the decade prior to the Revolution, the mood among the propertied and literate portion of the population swung decisively against the diversity of measures. The claim for uniform measures is everywhere to be found in the *cahiers de doléances*.³

Over the years, the Royal Academy had come to monopolise the authority over French metrological issues. Newly fashioned republican academicians were eager to

provide the intellectual instruments that would assist the central bureaucracy in its attempt to make a modern state out of France. In important aspects, *la France une et indivisible* was the making of men such as Condorcet, Lavoisier, Borda, Legendre and Laplace – an active and deliberate construct of theirs.⁴

In 1790, in the wake of projects presented to the National Assembly, of widespread grievances in the *cahiers de doléance* and of a deluge of suggestions from provincial learned societies, state engineers and citizens, the Academy was authorized to report on the various proposals concerning the reform of weights and measures. Academicians had considerable latitude in shaping the formless mass of demands voiced in the *cahiers* and elsewhere. Within three years, they added in succession four elements to the simple cry for a uniform system of measures. First, the single invariable standard would be *derived from nature*; second, the various measures of length, capacity, and weight should be linked via an interconnected *system of measures*; third, the base units would be divided into multiples and fractions according to a *decimal scale*; finally, an *ab ovo* nomenclature expressing the relation of the fractional units to the base unit.⁵ In time, those elements came to be presented as a unified «reform package».

Uses of Nature

The claims concerning the metre's «naturalness» and «universality» served both rhetorical and practical purposes. In deciding claims between metrological systems, nature was the ultimate source of authority appealed to. The marriage of nature and science elevated the metre above the politics of self-interest, making it seem non-arbitrary and independent of its creators. Naturalness was the unbreakable seal of the metric package.

Maurice Crosland identifies a range of possible meanings of the term «natural» during the eighteenth-century: it could signify mean or typical, it could be the antithesis

of artificial, or it could read as independent of revealed religion, of any national or political consideration. In the field of weights and measures, the most appreciated features of nature were its axiomatic constancy, security and universality. Its permanent and eternal character contrasted with the transience of human practices, institutions and monuments. The Revolution being a ready example of how even long established institutions could be toppled.⁶ The main justification offered for seeking a «natural» unit as universal was that it would not be linked to any given country or to any one particular interest, an important argument if the scientific enterprise was to be conducted by French and British on behalf of enlightened humanity, as was the case for some time.

Crosland makes the important point that standards based on nature implied a departure from the previous, and ancient, tradition of legally decreed standards. The definition of standards had traditionally been the rulers' prerogative. The fact that over the centuries rulers had decided in a contradictory manner only proved that the authoritative character of standards sprang from the ruler who decreed them. Of course, it is not the case that the new system would not receive legal enforcement, only that it was sanctioned by an even higher authority: it would not be supported *merely* by the law. The divine mandate to rule was thus superseded by nature in the supreme court of rhetoric appeal. Crosland detects here a parallel with the new, revolutionary rationale of government: universally accepted principles, rather than arbitrary power and tradition, were to be the fountainhead of legitimate government.⁷ The new system would *ipso facto* be incorruptible and eternal, able to outlive the physical destruction of its material embodiments. More to the point, the system provided a national standard *without* resorting to Parisian measures, at a time when the province suspected the capital of nurturing the same centralizing ambitions as the recently debunked absolutist monarchy.

The naturalness of the metre is wholly man-made. In fact, Crosland states, anticipating Alder's conclusion, that «In practice the new standard was not the Earth at all but a metal bar – just as it had been in the seventeenth century».⁸ As Alder shows in a brilliant exercise of de-black-boxing the metre, all of the metric system's five major components (uniformity, nature, system, decimal and nomenclature) and the metre itself are demonstrably human, cultural artefacts.⁹ Black-boxed, the metre was henceforth beyond the reach of political debate. Its natural, legal, indisputable and self-evident character spilled over to the entire system. Ironically, again, «where Condorcet had expected liberated citizens to assent to the self-evident truth of the new measures, the metric system was now presented as a doctrine that demanded uncritical obedience».¹⁰

Resistance

The Revolutionary governments were unable to impose the metric system upon the French. In February, 12, 1812, Napoleon adopted a system of «usual» measures, discontinuing entirely both decimal division and pristine nomenclature. The metric system remained the sole legal system for administrative work and wholesale transactions; it continued to be taught in schools; and metric units were still to be marked alongside «usual» units on all rulers.¹¹ In 1816, in restored France, Louis XVIII expressly forbade the metric system for ordinary transactions. Not until the revolution of 1830 did the proponents of metric reform make themselves heard again. In 1840 the metric system was finally reinstated. The metric cannot be viewed, as some historiography does, as one of the few effortless successes of the Revolution. One has to be able to see through the inflammatory revolutionary rhetoric the Revolution wrapped itself in. In Alder's phrase, «The French Revolution was not one thing but many things, although it was principally a contest to assert just what one thing the Revolution was».¹²

The metric system was not simply decreed. In France as in Portugal, we ought to try and understand its deployment as a story of the construction of acceptance and the

overcoming of widespread resistance. How is one to explain the resistances found in the French case? Heilbron lists four major reasons: consumers' fears that shopkeepers would raise the price of goods when they rounded up to new units; the fact that the decimal system does not lend itself easily to the division of commodities in halves and thirds; the difficulties an innumerate and illiterate population had in mastering decimal calculations; people's attachment to particular numbers for emotional or cabalistic reasons.¹³ Alder, while generally agreeing, stresses that one should consider that French citizens of the revolutionary period had to confront the problems associated with converting to the metric system from a world of pre-modern measures, deeply embedded in the practices and mentalities of *Ancien Régime*¹⁴ with its own moral economy.¹⁵ Turning peasants into Frenchmen (also) meant a move from a traditional metrology, in which measurement was an operation inseparable from the object being measured and the specific measuring device, to a modern one in which measurement is an operation whereby objects are described in abstract, commensurable units that refer to a universally conventionalised standard.¹⁶

The bill of August 1, 1793 declared the metric system obligatory within eleven months. Indifference and hostility followed. Parisian shopkeepers, caught between the law and their client's preference for old measures, illegally decided to keep both sets of weights. Abuses and confusion ran amuck. It was, Alder comments, a bitter irony that the metric system's implementation had triggered the very sort of frauds and inequities it had been summoned to terminate.

The crucial question was how to convince lay people, shopkeepers and wholesale traders to use new measures. Alder's explanation focuses on market dynamics and on generating acceptance. Creating a nationwide market implied that price alone would be the paramount variable; in order to achieve this, measurement had to be abstracted from objects and labour. Thus, local economies and their agents, which

partially survived by skimming off revenues from the in-between of local metrologies, had to be dissolved into a unified national market. It is only natural that local agents resisted this process which threatened to evaporate their role, and thus their livelihood. Indeed, the whole point of the metric reform was to replace an economy based on value, with one in which everything (human labour, as well as its artefacts) was translated into a single, variable: market price.¹⁷

Being offered a «proper» language, common people were expected to start thinking about exchanges in terms of market price of commodities and foodstuffs. Artisans and peasants ought to stop quantifying their output in terms of their labour's value. Proper, modern economic action would follow. To this end, the state acted to educate the citizenry on the marvels of the new system. The Agency of Weights and Measures initiated a propaganda war, issuing endless booklets and pamphlets explaining principles and offering conversion tables. Massive numbers of metre sticks and rulers were manufactured. This assortment of items was expected to produce familiarity with the system, and, in due time, acceptance. This proved to be, however, as later in Portugal, far from enough to ensure the system was learned, or even understood. To blame resistances exclusively on the ignorance of French peasants is to overlook the degree of disruption the metric system presented to relations between producers, shopkeepers, customers, land owners, artisans and merchants. The abstraction of commodities from the human labour and artefacts that had gone into their production had a potential to break long standing social and economic relations, which, in turn, sparked widespread resistances.¹⁸ The lower orders were not the only ones to resist; government bureaucrats and merchants who benefited from differences in standards did so as well.¹⁹ The state was forced to a compromise.

Alder stresses the protracted character of the erection of a nationwide market along the eighteenth century, local autarchies breaking down ever so slowly. He

correctly perceives the metric system as, simultaneously, a factor concurring to that transformation and one of its products. While some sort of uniform system was to be expected sooner or later, probably one based on Parisian measures, the specific metric character of the new system must be attributed to the revolutionary context. In those circumstances, the repudiation of tradition gave the authority of nature a privileged position and allowed the scientific community unprecedented leeway to design a hyper-rational language of measurement.

Late *Ancien Régime* Portugal: going slightly metric

In 1812, the Governors of the Kingdom appointed a special Committee to review Municipal Charters and Agricultural Developments.²⁰ As its work progressed, the issue of weights and measures occupied more and more the Committee's mind. Their labour resulted in a proposed bill effecting the standardization of weights and measures across the realm (November, 18).

Why the need for uniform standards? A high level of variance hindered inner commerce, which resulted in lesser fiscal revenues, both indirect and direct. Higher tax revenues were at one angle of the virtuous triangle that marked the end of the «old fiscal regime»: «Rulers recognized that there was an intimate connection between economic growth, the prosperity of the inhabitants of their lands, and the growth in their fiscal and military power».²¹ Late *Ancien Régime* states did not leave the setting up of nationwide markets up to market dynamics alone, not even mostly: they actively participated, trying to steer the process, not least by employing such policies as metrological reform, census-taking, and map-making.

In matters of weights and measures, subtle or less subtle nationalistic overtones were always present. This meant the metric system, «the French legal system», could not be proposed outright. The committee returned to the 1575 measuring standards bill;

a law, it was found, hard to restore. Everything the old law lacked, the metric system abounded in. Firstly, the ancient bill did not offer a constant and soundly established base unit. Next, it had not been conceived under a «general, scholarly, and systematic plan» because «therein weights and measures bear no relation between themselves; longitude measures are not associated with surface measures, nor are either linked to capacity measures.» Thirdly, even if the standards were the same across the territory, an extreme diversity of inner partitions would remain, because «each and every one of them is divided and subdivided in a particular manner, and no simple and common divider exists for all».²² The 1575 law fared badly in comparison with the metric system. A couple of points stand out: the value given to a scientifically designed metrology and the need for measuring standards to have a deductive relation between themselves, instead of a haphazard one. A law would be «provident, perpetual, and shrewd if whilst standardizing weights and measures to the public benefit» it would use to that purpose a single, solid and unchanging base, one which could not be altered nor lost, one depending on a very simple partition system better suited to commercial usages.²³

These would be, in abstract, the desirable features of such a system. In practice, the Committee turned to France for inspiration. Was not the metric system a fruit of the dread (to late absolutist minds) Revolution? The Committee's report stated that «since the early years of the Revolution, the French sought to put into practice a load of work and ideas whose necessity had already been recognized by the former Legitimate Government».²⁴ Next, the reports states: «Diverse and perhaps contradictory reasons could be put up to advise either the adoption of this system of weights and measures in its entirety, or the adoption of some other, more or less soundly conceived. In favour of the former, there is – First, the fact that the metric system presents all the advantages of the uniformity of measures with none of the inconveniences. Second, the ease with

which we could take advantage of the work done not only by the French, but by many European scholars who have taken this project to the highest level of perfection. Third, the more so because not only can this system provide the biggest comfort to our Agriculture and inner Commerce, but one day the system will offer the same convenience for external commerce we have with the nations where it would be in place; this will happen when Divine Providence allows the current and calamitous war to end, and when France and her allies are subjected to Legitimate and Humane Governments».²⁵ However, «if the delicacy of our times and National dignity which rightly repudiate anything that bears a French name, oppose the adoption of the Metre, or, for the same token, any standard whose base unit is another decimal part of the quarter of the Earth meridian, for that would be the same as the Metre, we can still resort to a Portuguese standard, the '*palmo craveiro*', which is already in use amongst us as base unit of linear measures».²⁶

December, 5, the government decided to send the report to the Royal Academy of Sciences, asking it to appoint one of its members to join the Committee and draft a «Plan to standardize weights and measures, appropriate to this century's great knowledge and *lumières*, under a general system with a solid and permanent base».²⁷ Ten days later the Academy appointed the following members: Francisco de Paula Travassos, Anastácio Joaquim Rodrigues and Mateus Valente do Couto; Alexandre António das Neves, António de Araújo Travassos and Sebastião Francisco do Mendo Trigo. João Bell was added by ministerial ordinance in late December.²⁸

Subsequently, a new committee to review the reform of weights and measures was set up. Albeit there was a strong majority, the moment the committee met, differences of opinion were heard. The majority recognized the importance of the issue and the hardships such novelty would face, not least those put up by ignorance. It concluded that inconveniences, if any, would be ephemeral. An arbitrary system could never be

permanent, nor general, across the territory, and a division other than the decimal would be more difficult to ingrain in usages as it would not be in accordance with the numbers. The committee recommended the metric-decimal system be adopted, retaining as much as possible the Portuguese nomenclature.²⁹ On February, 2, 1813, the Committee sent the report to the government, which eventually presented the whole package to His Royal Presence.³⁰

This report was very important for it was the first coherent statement issued by an authoritative institution. In fact, the Royal Academy enjoyed an indisputable status, in public opinion as with the government. It is not by chance that this report demarcated the field of discussion in the forty years to come. One of the milestones left in the field was the notion of the metric system as the preferred choice, though retaining Portuguese names. Moreover, the arguments used were exactly the same «enlightened» arguments known from the French case. This concurrence was complicated by the fact that, the Portuguese government still being a «legitimate» one, French troops were on-and-off invading the country, which created discursive abscesses that had to be smoothed. On the other hand, the compromises made herein, such as the preservation of old names, would later be thought the very founts of unease in adopting a complete system. Writing in 1859, with the metric system already underway, Fradesso da Silveira evaluated previous attempts at reform thus:

«In spite of the efforts by such distinct men [the Academicians], the reform of weights and measures was not carried out. After considerable expenses and many wasted attempts, the old system resisted and won, because legislators did not dare attack established usages head on. Whenever they tried to ease things, they complicated matters. Whenever they tried to remove obstacles, they aggravated the situation's natural difficulties. They wanted to compromise. However, by deciding to keep the old nomenclature and by tolerating the old configuration of measures, they have annulled the reform, and have strengthened the very system they sought to destroy».³¹

After acknowledging differences of opinion within the committee, the report clearly chooses the metric system.³² The report admits that there are many possible ways of «soundly» and «permanently» standardizing measures, such as propagating one specific standard to the whole country, «say, Lisbon's», and still keep the partition structure of extant measures. This was not the Committee's choice, because i) it would not be «proper of the century's *lumières*», it would not be «natural» to use the metric reference but not the standard, whilst keeping fractions and multiples; ii) this hypothetical system would not be «general» in the sense that every nation would continue to have its own autarchic metrology. Alternatively, a route to standardization upon solid ground would be to propose a constant base unit that was not one established through a relation with the meridian, but was in itself a fraction of the decimal division of the meridian (the metre), and taking that base unit as a term for a decimal progression, then deducing from it all linear, capacity and weight measures. This would be «a simple and luminous system, proper of the great *lumières* of the century, established as a general base for the entire universe, and with a base unit as solid and permanent as Nature itself, from where it is taken».³³

The Committee faced three objections against the metric system: it would offend national pride; there were sizeable differences with respect to old standards, and such differences would later beget great difficulties. In response, it argued that metric measures were not typical of any given country «but of all the Earth». Metric standards stood opposite to culture, they were «proposed by Nature» and structured by «Arithmetic». National governments could only «either choose to accept them or not». The Committee found it remarkable that so many foreign standards were kept in Portugal with no fuss, in their original names.³⁴ Concerning foreseeable hardships, it admitted to them in an early phase; however, the same would happen in the event of extending Lisbon standards. Finally, the reform was perceived as a means to assert the

central government and counter the excessive manoeuvring space of municipalities. Former rulers, we are told, «had always considered measuring standards to be a municipal matter, wherefrom followed the impossibility to homogenise them».³⁵

The Committee tried to deflect two other potential objections springing from traditional usages: the decimal division of standards and the use of a common standard to measure both solid and liquid foodstuffs.³⁶ The decimal progression had been known and in use amongst some professional groups, such as engineers and mariners, since the mid eighteenth-century. On the other hand, in the past, some standards had been known to measure both solids and liquids. This time, the argument ran in a different manner: rather than stressing the superiority of the system proposed, the committee picked up examples in past Portuguese history which conformed to metric-decimal provisos.

Some members disagreed with the majority. Let me stress this fact: in the future, opposition faced by the version of the metric system with Portuguese nomenclature can be traced back to a stance already found in the Committee's minority report, João Bell's. That said, in general, minority members just proposed minor amendments. Neves proposed to deepen the research on the existing system based on the 1488 law about the use of the «*marco de Colónia*» (weight standard) and the 1575 law. Then, «to select a linear measure; part of which would make up the cube of the capacity standard (for solids and liquids); a part of the latter filled with a certain liquid would amount to a certain weight, which would be designated as the base unit amongst weights».³⁷ To put these basic ideas (similar to the metric system) into practice, he suggested the use of the *vara*, which «was perhaps arbitrarily decided, however it seems to correspond to 11 parts, of which 10 are the Metre».³⁸ Travassos, while agreeing with the majority, opposed the immediate deployment of the reform and the rapid decision on names of measures. He proposed a nationwide comparison of municipal standards with Lisbon's, expressed metric units. The member João Bell presented various notes and writings

Timóteo Verdier had given him in 1806, resulting from experiments carried out on Tomar's standards. From this, he concluded that 2.2 metres equals 1 Portuguese *braça* and that 1.1 metres equals 1 *vara*. After some calculations, Bell added, agreeing with Verdier, that a cylindrical «*palmo*» was the base unit or «primitive standard» for liquid capacity measure, i.e., the «*almude*». Thus, he defended the extant *vara* as linear standard and that the old 1575 weight and capacity standards be «reintegrated».³⁹ That is, Bell proposed to keep the current Portuguese metrology but gave it a respectful past and an air of coherence.

D. João VI approved of the plan and commanded the Committee to elaborate on the means to extend the reform to Brazil and other overseas territories.⁴⁰ The government informed the Charters Committee⁴¹, and attached to it Sebastião Mendo Trigoso, Anastácio Joaquim Rodrigues and Mateus Valente do Couto, in order to «immediately fabricate the standards of the new weights and measures, conducting all experiments in the Chemical Laboratory of the National Mint».⁴² The government ordered the manufacture of every mould and part of the new standards of weights and measures.⁴³

Portuguese metrology proposed by the Reform Committee (1813)

Linear Measures		Capacity Measures		Weight Measures	
Names	Values	Names	Values	Names	Values
Milha	10000 mãos travessas				
	1000 mãos travessas	Tonel	1000 canadas	Tonelada	1000 libras
	100 mãos travessas	Fanga	100 canadas	Quintal	100 libras
Vara [metre]	10 mãos travessas	Alqueire	10 canadas	Arroba	10 libras
Mão travessa	1	Canada [litre]	1	Libra [kilogram]	1
Décimo	1/10 mão travessa	Décimo	1/10 canada	Décimo	1/10 libra
Centésimo	1/100 mão travessa	Centésimo	1/100 canada	Centésimo	1/100 libra
				Escrúpulo	1/1000 libra
				Decil	1/10000 libra
				Centil	1/100000 libra

Sources: adapted from Lopes, 1849: 25-26, appendix; and Silveira, 1859: 19.

Note: *one* «mão travessa» equals *the hundred millionth part of the quarter of the Earth's meridian* (= 0.1 dcm. or 1 tenth of the metre); *one* «canada» = $(1 \text{ mão travessa})^3$; *one* «libra» = *weight of distilled water contained in one canada*.

The 1815-1820 debate: which new system?

Between 1815 and 1820, and up to 1851, the debate on which new system to adopt revolved around two basic positions: one considered the extant system to be the best; the other considered the best system to be a metric-like one (within this position, there were those who would like to keep Portuguese nomenclature and those who would not).

In 1815, a member of the Committee, Trigo, published a memoir detailing the new metrological project, and, perhaps most interestingly, the rationale and worldview underpinning it.⁴⁴ This memoir was the first piece in an intricate exchange of criticisms between the Committee and Trigo on the one side, and Verdier on the other. Contributions to the discussion were printed in two journals published in immigration circles: in Paris, the *Observador Lusitano em Pariz ou colecção literaria, politica e*

comercial; in London, the *Investigador Portugues em Inglaterra*. I will now examine the unfolding of the debate and the manner in which it affected the work of the Committee until the critical juncture of 1820, the year of the Liberal Revolution.

To Trigoso's mind, the standardization of weights and measures was a sure sign of modernity, comparable to uniform time measurement. All cultivated nations used the annual calendar, subdivided in a like fashion. However, when it came to linear, capacity, and weight measurements each had its own standards, «sometimes with the same names, oftentimes with very different values».⁴⁵ He introduced his stock argument, metrological chaos:

«The Portuguese, all speaking the same language, subject to same Laws, and to the same Government, are acutely diversified on this issue: it is not just each Province or each *Comarca*, but each Village, and every Municipality has its own particular Standards; what *Alqueire* or *Almude* are for some, are little more than half to others; and the same metrological terminology is so variegated that anyone travelling unadvised across our provinces would have a thousand occasions to think he was in Foreign Countries.»⁴⁶

The quote is paradigmatic. Herein, the author clearly states the main arguments later to be used in support of the metric system: the link between one nation, one language, one body politic, one law – and one standard – is contrasted with the variance in measuring standards from municipality to municipality and a metrological landscape so chaotic that anyone travelling within would think he was travelling abroad.

In Trigoso's view, the struggle to impose the metric system is but one instance of the general combat between «habit» and «reason». Because «habit is stronger than reason», there has always been someone who «thinks not only any that reform in this respect is superfluous, but also that inequality is profitable». Paraphrasing La Condamine, he argues: «if commerce is the exchange of the superfluous for the necessary, then the simplest means to facilitate exchange will be those more advantageous for commerce». If merchants find the current system «comfortable» or

expect to take advantage of differences between local metrologies, they are seeking an «illegitimate profit».⁴⁷

We have seen that to argue the need of a new, uniform system of weights and measures brings historical continuity to the fore. To provide an interpretation of the past, a certain reading of history, is always to politically define the present. One arguing in favour of a new system, especially if that system were the metric, had to disrupt historical continuity in arguing that the extant system, a fruit of Portuguese history and established by «tradition», was useless and vicious. Moreover, one had to bandage that wound whilst explaining why a French system should replace it, a difficult task when French troops were invading the country and the court had fled to Brazil. On top of that, for someone like Trigoso, arguing from within an absolutist mindset, it became even harder to sustain that the best choice would be a brainchild of the feared Revolution. How did he square the circle?

Trigoso uses the heightening-of-commerce-argument, contrasting images of Portugal before and after the Discoveries. The argumentative case is constructed via a negative definition: by outlining the conditions under which Portugal and the Portuguese lived *then*, he defines *a contrario* the way they are *now*; by pointing out the necessities they had *then*, he suggests the different needs they feel *now*; by articulating Portuguese character and necessity in the historical production of a given measuring system *then*, he makes the case that *the same* People, feeling *different* needs, in *different* conditions must collect the historical fruit of the *Lumières* and of the «commercial century» in which they live. In fact, the argument goes, they were the precursors of modernity who lagged behind, as if intoxicated by the fumes of Brazilian gold, and the laziness it obtained. If the Portuguese truly wanted to realize their modern selves they could not fail to embrace the metric system. Up until D. Manuel, one had witnessed a profound «inconstancy in public spirit, which almost simultaneously wished measures

to be smaller, bigger, equal, and unequal». Had the Portuguese engaged in commerce as much as they later did, Trigos argues, their minds would have been made up on this issue sooner. «However, the nature and customs of Peoples, especially in the infancy of the Monarchy, were very different from what they would later become».

«[The Portuguese] Furthered from the rest of the World by their geographical position, experienced few or no necessities closely connecting them with other Nations: domestic and Christian virtues made the bulk of Portuguese character. Sedentary by nature, though valiant, the war with Spain was almost the sole stimulus pushing them to leave their Homes for a short while: because luxury was modest, monies short, and the Court always on the move, the Capital had not yet grown considerably, nor devoured the juice of Provinces as it later did; furthermore, the Provinces being much more populated in proportion than now, they consumed the most of their own productions, and produced enough for self consumption. In a country where men are frugal, and subsist that way, it is less important that measures in different *Comarcas* are unequal, since there are few occasions for foodstuffs of a certain and limited realm to go out [...] since it is good faith that most of the times vouches for contracts.»⁴⁸

Everything that once explained variance in measures had been superseded by history. Since D. Manuel, commerce had increased exponentially, the capital grown so much as to make the kingdom monocephalic. Portuguese nationals from every province rushed to the new Metropolis, contacts with foreign nations and peoples multiplied, the interaction between peoples become closer and more frequent. Lisbon standards gained importance. That is why D. Sebastião's law of 1575 decreed the uniformity of all standards by the Lisbon ones. However, the reform had failed because new standards were defective and fraudulent, and never reached municipalities. Conversion tables between new and old measures were never accomplished. Generalized sloppiness and commoners' lack of illustration did not help.⁴⁹ Hence, he concluded, the metrological landscape had grown chaotic ever since. Trigos sums up the accusation of old Portuguese standards: lack of uniformity, lack of relation between linear and both capacity and weight measures, variance of internal partition structures, and arbitrariness

of base units. As for the remedy, he submits the metric trinity: m, m², m³, though with Portuguese names rather than Greek-Latin.

Concerning implementation, Trigosso points out possible hurdles: «first, the difficulty that the People, for the most part ignorant, would have in putting aside measures to which they are accustomed since infancy, and in adopting new ones, whose values and divisors [they] do not yet know; second, the confusion and encumbrances new measures should bring upon rents, pensions and dues, which are paid in kind and which had been set in accordance with old weights and measures: third, and finally, the shams vendors may play on buyers, because new measures are given names similar to their predecessors, even though most of them have a much smaller value».⁵⁰ «This Resolution», he continues, nurturing his ruler's vanity, would pay «the biggest Honour» to D. João VI «to whom was reserved the glory of tramping under his feet the puerile jealousy of taking what is good from other Nations, of opening this front of National prosperity, of destroying the obstacles that from this side have oppressed Commerce in its march, and of vanishing from its vast Dominions the inequality of measures».⁵¹ The Portuguese ruler's avant-gardism would indeed stand out at a time when almost no other nation had adopted the system.

July 1815, an anonymous letter published in the London-based *Investigador Português* gave Timóteo Verdier the opportunity to counter the plan sponsored by the Committee.⁵² Verdier wrote a letter to Francisco Maria de Brito, *chargé d'affaires* in Paris, supporting João Bell's minority report. He stated that the current measuring system was fine.⁵³ Brito forwarded the letter to the government, attaching a memoir authored by Verdier on Portuguese weights and measures which had been published in the *Observador Lusitano* in April 1815, along with Tarbé's *Manuel Pratique des Poids et Mesures* in the 1813 edition.⁵⁴

Trigoso's metrological proposal (1815)

<i>Linear Measures</i>	
Posta or <i>Myriametre</i>	10 000
Milha or <i>Kilometre</i>	1 000
	100
	10
Vara or <i>METRE</i>	1
Mão travessa or <i>Decimetre</i>	0.1
Centesimo or <i>Centimetre</i>	0.001
<i>Capacity Measures</i>	
Moio or <i>Kilo-litre</i>	1 000
Fanga or <i>Hecto-litre</i>	100
Alqueire or <i>Deca-litre</i>	10
Canada (<i>Litre</i>) = 1 cubic mão travessa	1
Decimo da Canada or <i>Deci-litre</i>	0.1
Centesimo or <i>Centi-litre</i>	0.01
<i>Weight Measures</i>	
Tonelada	1 000
Quintal	100
Arroba or <i>Myria-gramme</i>	10
Libra or <i>Kilo-Gramma</i>	1
Décimo de Libra or <i>Hecto-gramma</i>	0.1
Centésimo de Libra or <i>Deca-gramma</i>	0.01
Escrúpulo or <i>GRAMMA</i>	0.001
Decil or <i>Deci-gramma</i>	0.0001
Centil or <i>Centi-gramma</i>	0.00001

Source: Trigoso, op. cit., 1815, pp. 54-65.

Verdier's 1815 memoir was the first clear challenge to the Committee's findings and delivered the first blow in the polemic. He criticises the diversity of extant standards, inventorying, not without some irony: «we have the terrestrial *braça* that gives the *vara*, and the *palmo* with its decimal subdivisions; the *toesa*, from which are derived the *pé*, the *polegada*, the *linha*, and the geometric *passo*; the *côvado* which is subdivided in halves, fourths, thirds, and sixths; the *braça* from the *ribeira das naus* or marine *braça*, whose divisions take the name of *pé*, *polegada*, and tenth of *polegada*. This *braça* and the *côvado* have no finite relationship with other measures.»⁵⁵ What he describes as

«confusion and irregularity» in measures had been tackled by «wise and pondered men» before. The inane state of affairs was due to «wars with which we have been punished, to the disasters with which the Divine Providence sometimes [...] wanted to break our spirits». He signalled D. Sebastião's reign (died 1578) as the starting point of the kingdom's decay. The fact that several municipalities refused to abide by the 1575 law explained the state of matters. Municipalities «did not accept a reform that ran against certain customs kept more by particularistic interests than by people's ignorance».⁵⁶

The French «retreat» of 1812 served him as an exemplary case. Verdier is clearly in tune with the Napoleonic reform of 1812. He does not wish to change nomenclature, nor usages, especially in inner and outer commerce. Positioning himself in the tracks of D. Sebastião, he wishes nothing more than uniformity in measures: «let us not change nomenclature or internal partition [...]; we are aware of the French government's experience, forced to reconcile science and ignorance [...]. One should always keep the original units of ordinary or *usual* measures and weights in a precise relation with the metre».⁵⁷ Verdier additionally defends the preservation of old names and partition by tracing Portuguese measures to the work of the great mathematician Pedro Nunes (1502-1578). Much fuss would be made about this particular claim.

Verdier's linear metrology (1815)

10 <i>braças</i>	=	22 m
1 <i>braça</i>	=	2.2 m
<i>Vara</i> , ½ <i>braça</i>	=	1.1 m
1 <i>palmo</i>	=	0.22 m

Source: Verdier, *Memoria...*, op. cit., 1815, p. 546

The arrival of Brito's dispatch originated some doubts, prompting the government to ask the Committee for advice.⁵⁸ The Committee replied within a week, forcefully arguing against the following points: i) the extant system is appropriate, was invented by Pedro Nunes, and the metric system's foreignness smears the reputation of Nunes

and discredits Portugal; ii) the metric system is hard to put into practice, so much so the French, who invented it, partially do not use it anymore on the grounds of inconvenience; iii) the Committee's system is too lengthy and incomplete.⁵⁹

To the first objection, it was replied that metrological works done in the early 1800's established the *vara* to be equivalent to 1.105m, (only by convenience 1.1m, as Verdier claimed). Extreme variance characterized capacity measures due to a limited generalisation of the 1575 standards, «known to under one-sixth of the municipalities».⁶⁰ The Committee thought these standards, where they did exist, should be similar...so chose a couple of well-kept standards from Tomar and Vila Verde...only to unearth sizeable differences between them, and between both and that of Lisbon, thus concluding the impossibility to «grasp by observation the system of our current measures, if there ever was one».⁶¹ Portuguese metrology was «purely arbitrary».⁶²

Next, the Committee tackled the issue of whether Portuguese metrology was based upon a «philosophical system» and whether there was a scientifically determined base-unit to it. Contrariwise to Verdier, the report seeks to prove that the mathematician Pedro Nunes had not accurately and scientifically defined in 1573 the meridian's length.⁶³ This issue, heatedly and lengthily debated between the Committee and Verdier need not occupy us here, except to the extent that the ability to define the «correct» answer was crucial for rhetorical reasons. If someone, say Verdier, argued that current Portuguese metrology was an articulated system, based upon a scientifically determined base-unit, a «philosophical system» whose authorship belonged to a Portuguese mathematical genius of the sixteenth century, who, to base said system, had determined the length of the meridian, then it would be that much harder to support a new, non-Portuguese, and «exotic» system.

The current system being «irregular», the Committee chose the metric. If any new system would face encumbrances, why not the metric? It assumed that no one would

disagree about taking the Earth as the base for the metrological system. There were two options: either use the French metre as linear standard under the name «*vara*» or leave the *vara* to common usage and retail commerce, as *usual* measure, with a pre-determined and fixed relation to the metre (which would be used solely to gauge the *vara*). To opt for the latter would not be fitting to the century's *esprit*, the Committee stated. However, it came up with a more powerful argument to sustain its choice:

«If the easiness of Commerce, and mercantile accountancy, and the desire to avoid not only frauds, but errors of calculation, make the uniformity of measures within one country desirable, would not these same motives justify the existence of a single and identical standard, at least for the more commercial countries in Europe? [...] One could argue that is not enough that France and Portugal have identical measures for every other country to do the same; that is so, but each Nation answers for herself, and if this contribution for the common good is not a virtue, it was reserved for this day and age to be considered as wrongdoing. We have adopted the Metric-Decimal System without its cumbersome nomenclature, which will never be admitted by other nations; because even if a time will come when measures are universal, language is not».⁶⁴

Regarding Verdier's objection to decimal division, the Committee reasoned that those who had some inkling of maths would understand right away, those who did not, would not understand the decimal just as they had never understood the sixths, eighths, etc. In consideration of customary usage, the Committee proposed standards be divided in doubles, halves, and fourths. These decisions were thought to incorporate the French experience that led to the «retrenchment» of 1812⁶⁵, while avoiding its inconveniences, which established two different kinds of measures: the *usual*, used in retail commerce, and the *legal*, used for contracts and wholesale commerce (usual standards were the old ones, legal standards were the metric-decimal). D. João VI expressed his approval of the explanations offered by the Committee.⁶⁶

January 1819, the Paris-based *Annaes das Sciencias, das Artes e das Letras* published an anonymous letter sent to Brito. This was the letter supposedly sent by

Verdier in 1815. The letter is dated 28-8-1815 and contains some added notes and remarks.⁶⁷ Actually, Verdier's memoir originally published by the *Observador* in 1815 was re-published in the *Annaes* also in 1819, with the title «Memoir on the Measures and Weights of Portugal in comparison with the actual Measures and Weights of France, copied from the *Observador Luzitano em Paris*, amended and added by the Author». ⁶⁸ The letter contains the accusations and objections to which the Committee had already replied on 13-12-1815. In his added note n° 5, Verdier defines his standing:

«A simple reform, accommodated as much as possible to the usage and language of the people is what can and should be done in Portugal in order to avoid complaints, grievances, protests, lawsuits, fraud, etc., which unfailingly will be born of the changing of names, and of any alteration in matters of weights, and measures. This recommendation seems wise (to me) because, on the one hand, it has been proven by experience in France, and, on the other, because it corresponds to the intentions of Their Excellencies D. Rodrigo de Sousa Coutinho, and Araújo.» ⁶⁹

This normative remark illustrates the limits of a reform position within an enlightened absolutist mindset. The example of France is offered again and again, whether to illustrate the dangers of radical reformism and of the Restoration government's wisdom in retreating and compromising with «the people», or as exemplary of that same reformism's merits and ability to break with corporate interests, in the name of the good principles of rationality and of the *Lumières*. Most interestingly, Verdier thus evaluates the French 1812 «defeat»: unlike himself, «those gentlemen» of the Committee had not witnessed first hand the difficulties with which the metric system had been faced in France. They

«[U]ndoubtedly ignore that in 1812 the Government of France and the Institute entered into an agreement with the populace about the metric system, the ignorance then obtaining, in support and in favour of public order, an almost landslide victory over science, after an 18 year war between the people and the government, during which the latter was obliged to repeatedly concede truces and postponements of execution, the more prolonged, the bigger the breadth and vigour of governmental orders. The Committee perhaps ignores that finally the government, obliged to

compromise in part its wise project, combined the system with the names, divisions and usage to which the people was formerly accustomed». ⁷⁰

Trigoso replied to the anonymous onslaught on the Committee's labour by publishing yet another memoir in the *Annaes*.⁷¹ Even if the key-arguments of the debate had not changed since 1815, circumstances had: the same arguments re-published in a respectable and widely read journal in immigration circles at a moment in which the reform was making decisive strides were worth replying to – that, and maybe an irrepressible taste for polemics.

Trigoso painstakingly explains how the Committee set off by checking extant standards in order to evaluate if there was, in the 1575 law, a proportion between linear and capacity measures, or if there was any legally decreed linear standard at all. Subsequent experiments on the Tomar standards had shown the *vara* to be 1.08 of the metre (departing from Verdier's 1.1). Repeated experiments on other municipal standards had yielded different and uneven results. Moving to capacity measures, it was found that standards varied greatly and that the 1575 law had had a very limited diffusion; also, standards had been poorly built and displayed significant variance. His own experiments on the standards of Tomar, Torres Vedras, and Vila Verde dos Francos, Verdier's on those of Tomar, and Monteiro da Rocha's on those of Coimbra led Trigoso to conclude the «arbitrariness of our measuring standards». ⁷² This conclusion was the exact opposite of Verdier's own.

Next, he takes on Verdier's argument that Pedro Nunes had created a coherent «philosophical system» in inventing Portuguese metrology and that he had accurately determined the length of the meridian.⁷³ Why this talk of Pedro Nunes? In Trigoso's phrase, the summoning of Nunes was «a mere ghost, with which to stun the eyes and alienate the spirits from the Reform [...] already approved and ordered, manoeuvring the people through their most sensitive side – national pride and glory – which is

inculcated as having been insulted in the supposed spite with which one of our towering sages has been treated». ⁷⁴ After restating the bulk of the arguments he had used in his 1815 memoir, Trigosó pragmatically points out what needs to be done: conclude the comparison between old and new standards, as well as the distribution of sets of new standards to major cities and secondary towns. ⁷⁵

Weights and measures on the eve of the Liberal Revolution

The polemic about metrological reform revolved around two main poles symbolized by Verdier's and Trigosó's positions. Verdier asserted the existence of a coherent and soundly-based national metrological system, wrapped up in the authority of a prestigious scientific pedigree and a distinctive Portuguese character. Trigosó asserted such a system was a fantasy; reality was a metrological chaos, hence the need of radical reform. To the former, reform meant the extension of Lisbon standards to the entire realm, keeping current internal partition and nomenclature; to the latter, it meant the implementation of the metric system across the realm, retaining, however, traditional names.

As the analysis of Verdier's and Trigosó's pieces evinces, and I would like to underline, both positions acknowledged the existence of a metrological chaos. Indeed, one of the debate's major results was to ascertain the existence of said chaos, in the guise of a rhetorical construct which burgeoned with every polemical blow. Moreover, this chaos had evolved from a mere literary or impressionistic existence to a more palpable reality by way of comparisons carried out between standards old and new. From the moment comparison figures started to pop up, metrological chaos was black-boxed as scientific fact. The extreme variance of measuring standards, most noticeably in capacity measures, was used to support both lines of reasoning. On the eve of the Liberal Revolution, this dialogical process helped to establish the chaotic nature of

Portuguese metrology in the mind of both political and scientific elites. Henceforth, it became uncontroversial, a given, the indisputable starting point of any future attempt at reform. The difference being, of course, that after the 1820 Revolution such disarray was equated with *Ancien Régime* backwardness, and the reform of weights and measures came to epitomize the Liberal program itself.

In an 1818 report, the Committee stated, on the comparison of municipal standards in Estremadura: «Almost every Municipality has lost their bronze standards, given by King D. Sebastião; most of the extant standards are made of wood, clay, or tin plate, cracked, broken, and altered, showing signs of not having been in use for long».⁷⁶ In 1820, Trigos recalled there were «over one thousand Municipalities», almost every one of which had their peculiar measuring standards. «Very few are alike and most of them display sizeable differences». Variance was coupled with the break in the relation between base unit and multiples and fractions: «the fourths and the *canadas* are, in proportion to the *alqueire* and the *almude*, stronger here, weaker there, according to what Municipalities thought would be in the wholesale traders' or people's best interest». The French invasions had worsened the situation: many municipalities misplaced standards and subsequently resorted to privately owned replicas. Metrological chaos only made «radical reform» that much more «necessary and indispensable», Trigos redundantly concluded.⁷⁷

Action was therefore much needed. While the controversy was raging, the Committee kept busy deliberating. In the beginning of 1817, it decided what standards should be made of (half-bronze), how the *vara* (metre) would be divided, and the shape (cylindrical) of liquids and solids capacity standards. Moreover, it decided on the number and kind of two sets of standards, to be distributed to every head of *comarca* and second-order municipality. In the Army Arsenal, 50 sets of the former and 250 sets of the latter were built and gauged by original prototypes that had been brought from

France in 1802. The Committee compared new standards with standards coming from municipalities in the Province of Estremadura, which, along with other Provinces' standards, had to be collected in the Arsenal and compared in order to draw conversion tables.⁷⁸ There is a single surviving table, dealing with Estremadura; track has been lost of other tables which would have been published at the time.⁷⁹

August 1818, the Committee filed a report stating that, in 1816, it had drafted a proposal for a «Project of Regulation» to accompany the upcoming law on metric reform.⁸⁰ The government had approved said project.⁸¹ In 1818, the aim was to push the government to provide the means to further the reform, namely monies to complete comparisons and the passing of a definitive Law and Regulation. Thus prompted to act, the government sanctioned the Committee's plan, in what was felt to be a decisive phase.⁸² The Committee was re-appointed by ministerial ordinance.⁸³ Subsequently, the government commanded municipalities, via the *corregedores de comarca*, to send to the Army Arsenal every measuring standard in their possession. Upon arrival, they were compared and the results filed in the National Archive (*Torre do Tombo*); comparison tables were drawn and published by the Royal Press. A metrological era was coming to an end, or so it felt. So much so that some old standards enriched the Arsenal's Museum Room, and others were handed out to the Royal Academy of Sciences, the National Mint, and the Ajuda Royal Museum. Henceforth, old standards were to play the role of «monuments of antiquity».⁸⁴

Readiness to implement the reform was achieved by the first months of 1820. Comparisons were well under way and tables were being published; old standards were making their entrance into museums; newly manufactured metric standards waited at the Arsenal to be distributed to municipalities. Orders to that end were passed to public officials in Estremadura and Algarve. Administrative procedures began to flow top down through the peripheral structure. Once the new standards arrived at the

municipalities, *corregedores* were instructed to publish an edict commanding every person or corporation to have their standards gauged by the new within three months. The edict also invited commoners to acquire standards gauged by the new ones, so that the gauging might be well under way by the time new measures were legally enforced. On March, 3, 1820, the Governors urged elementary teachers to have their pupils «learn by heart the Pamphlet issued by the Committee in order to give people sufficient knowledge of the system before it was actually enforced».⁸⁵ After all this toil, orders and ministerial ordinances were never carried out because the Liberal Revolution broke out. Triggered by the August, 24 events in Porto, the Revolution rapidly swept Lisbon and the Provinces, eschewing the British tutelage of Portuguese army, politics and commerce, doing away with the discredited «Governors of the Kingdom scheme», which was rapidly making a Brazilian colony out of Portugal (voices everywhere whispered out loud), and toppling, almost *en passant*, the *Ancien Régime*.

Paradoxically, one concludes that it was the Revolution itself which prevented the reform of weights and measures from being put into practice.⁸⁶ The Revolution disrupted an ongoing process that was fast approaching the decisive implementation phase. The fact that the early Liberal period was characterized by political and civil unrest hindered the deployment of medium-term territory-oriented policies; indeed, it cast doubts on the very existence of a stable and recognizable state apparatus. The three decades between 1820 and 1850 have been aptly described as a continuous civil war. Not until the 1840's, but especially from 1851 onwards, was it possible to deploy policies with a heavy component of logistic and territorial incidence. In the domain of weights and measures, as well as in map-making and census-taking, it was not that Liberal policies differed radically from late *Ancien Régime*'s, but that after 1851 they were actually put into practice.

Constitutional Liberalism

In April 1821, once the Constitutional Congress met, deputies asked the government for all papers concerning weights and measures. Little to nothing happened until 1823. That August, following the political turmoil, which had brought about a liberal backlash, the former committee on weights and measures sent the government a memorandum demanding the plan be implemented, and recalling the hardships imposed upon municipalities left for such a long time without standards. The committee also forwarded the drafts of the metrological Law and Regulation it had been preparing for years. The same official letter stated that «by an excess of prudence, and in order not to counter people's habits, [the committee] thought [the reform] could be limited to linear and capacity measures», leaving weights aside for the moment (for being already uniform).⁸⁷ The committee was almost immediately called to meet with the minister of the Interior Marquis of Palmela, November 1824. At that meeting, doubts were cast on the quality of earlier comparisons, either because municipalities cunningly had not sent their lawful standards, or were suspicious of the comparative procedure, the rightfulness of which they claimed not to have witnessed.

These were issues that were to come up time and again. On the one hand, the comparison as a procedure was a critical issue because it hinged on trustworthiness, and trust depended on comparisons being done before the public eye. To be effective, it was advisable that they be witnessed by an audience composed of aldermen, shopkeepers and lay people, i.e., by those whose cooperation had to be enrolled in order to achieve abidance. On the other hand, municipalities were a key-actor to be reckoned with in the implementation circuit. Having this in mind, it was decided to send engineering officers to the Provinces to carry out comparisons in the presence of the municipal body. Special instructions were drafted to this effect in December 1824. However, nothing happened for the next couple of years.

In 1827, the House of Deputies appointed a special committee to accompany the reform of weights and measures,⁸⁸ who advised the government to proceed to new comparisons (greenlighted on February, 24) so that a bill would be proposed at the Houses of Parliament the next legislative session, 1828. By the minister of the Interior's request, the committee drafted fieldwork instructions to guide engineers in their task. In March, this proposal was approved and made into a ministerial ordinance.⁸⁹ The same ordinance appointed a handful of engineering officers to the provinces and ordered the committee to meet on a regular basis so as to give operations the biggest possible thrust. According to Lopes, actual fieldwork begun only in 1828 and was concluded (with the exception of a few municipalities) before the year's end. That same year, D. Miguel consummated the «Usurpation» which, to make a long story short, led to the civil war of 1832-1834. It would be an understatement to say that reform, metric or any other, was not a priority in the mind of Metternich's dutiful pupil. In fact, the *alqueire*, *almude* and *vara* were potent symbols of the pristine order of which D. Miguel was a living embodiment.

In the aftermath of civil war, 1834-1840

After D. Miguel's absolutist rule and subsequent showdown with his brother in the civil war, amounting to a total interruption of metrological works from 1828 to 1834, one of the first decisions taken by the victorious D. Pedro upon his triumphant entrance in Lisbon, on July 24, 1834, was to reinstate the committee of weights and measures.⁹⁰ The committee had to report on the best metrological system, suited to fit the goal of making measures uniform.⁹¹ It did nothing of substance. Apparently, the committee's appointment served the purpose of signalling that Constitutional Liberalism left no stone unturned, and that metrology was to become a field of reform like any other, and an important one too.

In 1834, when the Houses of Parliament reopened (August, 8), Teixeira Gyrão presented his own reform project in the Peers (session 17-9-1834). He accompanied his project with the publication of a memoir on the subject.⁹² Gyrão had been a member of the metrological committee in the constitutional Houses, back in the twenties. Back then, he explains, he was very much in favour of abolishing Portuguese linear measures. Not any more. He sets out to deliver a decisive blow in the rhetoric struggle for the definition of the origins of Portuguese weights and measures. One must understand his efforts as part of the fight to acquire legitimacy and authority within a given polemical context. A clear case of invention of tradition, the supposedly classical Greek origin of Portuguese measures was instrumental in supporting arguments in favour of this, and not that, course of metrological reform. The author offers various reasons to retain Portuguese traditional measures: their originality, antiquity and affiliation to ancient Greek science; and an internal partition adapted to day-to-day usages. In the second part of the memoir, he lays out his thinking «in order for measures to be easily standardized, and with no inconveniences, in harmony with the French metric system, whilst preserving without much change all of its nobility and portentous antiquity».⁹³

«If we look in general to the Measures and Weights of the Kingdom, we see huge inequality and disorder in those of capacity; order and equality in linear and weight ones, except for some changes which have occurred recently. However, if we look strictly to Lisbon's, we will find order, equality and an ingenious system, in which Arquimede's imprint has not yet been completely erased».⁹⁴

Lobo Gyrão's proposed metrology (1833)

<i>Linear Measures</i>		
Palmo craveiro		2/9 meter
Vara or ½ Braça	5 palmos craveiros	1/9 meter
Braça	10 palmos craveiros	2 + 2/9 meter
Toesa	9 palmos craveiros	2 meters
<i>Weight Measures (new)</i>		
Arrátel		500 grams
Onça	1/16 arrátel	
Oitava	1/18 oitava	
Meia oitava	½ oitava	
Grão novo	1/10000 arrátel	
20 Grãos novos		1 gram
<i>Capacity Measures</i>		
For Solids		
Alqueire (<i>metreto</i>)	1 cubic palmo craveiro	11 litre
Salamin	1/16 alqueire	
Fanga	4 alqueires	44 litres
For Liquids		
Pote (<i>metreto</i>)	1/10 cubic toesa	8 litres
Canada	1/20 cubic toesa	1 litre
1/8 canada	1/40 cubic toesa	

Source: Gyrão, 1833: 52-54.

At the time, another reform project was also presented to the House of Peers, authored by Sá da Bandeira (session 15-10-1834). That same October, upon Gyrão's request, a number of notable persons were invited to «help the House of Deputies» and take part in the committee, to wit: Manuel Gonçalves de Miranda, António Aluísio Jervis de Atouguia, Mateus Valente do Couto, António Dinis do Couto Valente, Marino Miguel Franzini, José Maria da Costa Neves, and Cipriano José Soares. According to Lopes, a few meetings took place but nothing ever transpired. There was a prolonged hiatus in the committee's labours.

From November 1839, a new government was in office and, in January, the minister of the Interior, Rodrigo da Fonseca Magalhães, charged the engineer Mateus Valente do Couto, a member of the original 1814 committee, with assessing the reform

projects which had been on the table since the mid 1830's, pointing out the most adequate.⁹⁵ Couto worked swiftly, and presented his report within two weeks.⁹⁶ Therein, he starts by establishing the good doctrine in these matters: one ought to consider metrological issues to be in the best interest of many nations, and never the sole interest of a single one, due to overriding interests springing from international commerce. However, as experience had shown him, such a reform is always a most difficult one to carry out, for each nation becomes obsessed with preserving her own system – and this, in his view, was the major obstacle.⁹⁷ Couto distinguishes between two distinct goals: one, to standardize measures, the other, to universalise measures. If one wanted to make measures uniform, he favoured the idea of keeping the extant *vara* and generalising Lisbon capacity measures. If one wanted to universalise, he favoured the metric decimal system, though keeping traditional nomenclature. He then recalls how several attempts had tried to solve the difficulty in choosing a new linear base measure. Verdier had argued that the current *vara* was deduced from the meridian and that national weights and measures displayed finite and well reasoned relations between them, that they were a «philosophical system». Gyrão had invented a new linear base unit deduced from the length of the ancient «*palmo craveiro*», allegedly an aliquot of the meridian. M. G. Miranda had chosen for his base linear measure the side of a cube which filled with pure water would weigh one *arrátel*. Couto counters these scenarios and closes his remarks by repeating the principles which had supported the 1813 committee's decision: weights and measures should be based on the metric decimal system, allowing some changes in nomenclature and partition and should be immediately put into practice in every public department and contract; meanwhile, folks should be allowed to use the *vara* for some years and Lisbon measures be extended across the country.⁹⁸

The 1840 external committee to the House of Peers

In the meantime, Sá da Bandeira renewed his initiative in the Upper House, which decided on January 27, 1840, to re-appoint the 1834 external committee with the addition of José Feliciano da Silva Costa, Sá da Bandeira, Manuel Gonçalves de Miranda, Bernardino António Zagalo, José Cordeiro Feio, and José Maria Bergara. This new external committee presented its report to the Peers in October 4, 1840, signed by all committee members except Couto and Gyrão.⁹⁹ The significance of this report is twofold. On the one hand, it presents the case, and details the proposal, for rendering measures uniform by generalising Lisbon capacity measures to the whole kingdom, assuming of course linear and weight standards to be fairly uniform throughout. To maintain, to keep, to conserve are verbs repeatedly used in the report:

«It is convenient that Length and Weight measures remain as they are; that the measures for solids and liquids be equal across the realm, and regulated by Lisbon measures; that the fractions and multiples, and denominations, of these measures be conserved exactly as they are, eliminating however the linear measures *pé*, *polegada*, *linha*, and *ponto* because they are useless, of foreign origin, and because they disturb the ancient decimal division of our linear measures, generally attributed to Pedro Nunes».¹⁰⁰

The apparent metrological conservatism is perhaps born of the wish not to stir public opinion. Nonetheless, one can interpret metrological conservatism as administrative prudence and political shrewdness, a stock and trade argument in Parliament. Some of the conservative, prudent and patriotic traits of the report can be affiliated with Verdier's stance, as the reference to Pedro Nunes and to the foreign origins of some standards suggests. On the other hand, the report is signed by a significant number of senior politicians, many of them of left-progressive inclination, such as the Viscount of Sá da Bandeira. Many of these politicians will have, in years to come, the capacity to influence public opinion and policy-making, either as deputies, peers, ministers or active public intellectuals. As we shall see, the external committee's position will be

used as a rhetorical reservoir. It will be re-articulated many times, in Parliament as in the press, unfailingly to counter more radical metrological stances. Henceforth, to decide upon these matters will mean choosing between some variety of the metric system and the extension of Lisbon measures.

Going slightly metric, again: 1845-1851

The 1845 parliamentary debate

João Baptista da Silva Lopes now actively enters the course of events. He was elected deputy to the 1842 legislature by the constituency of Faro. Upon assuming his office in Parliament he asked the House to appoint a special committee to review the issue of weights and measures and eventually to propose a new reform (session 13-1-1843). The Lower House acquiesced, appointing a special committee made up by Silvestre Pinheiro Ferreira (president), Luis da Silva Mousinho de Albuquerque, José Cordeiro Feio, João Elias da Costa Faria e Silva, Felix Pereira de Magalhães, Joaquim António da Costa Sobrinho and Lopes himself (acting as secretary). Shortly after, Pinheiro presented a project-bill of his own,¹⁰¹ then sent to the committee, which having examined it along with the papers the government had remitted, decided to adopt a modified version of the metric system, laid down in a project-bill dated 8-5-1843.¹⁰²

Although formally requested in the bill, by the end of the 1844 parliamentary session, no comment, observation or proposal had been made by corporations, municipalities or private citizens. Thus, upon Rodrigo's request, both report and project were printed and scheduled for debate in the Lower House. The general discussion of both started in January 20, 1845.¹⁰³ The accompanying report, a preamble of sorts, which had been printed in the *Diário do Governo*, requires attention.¹⁰⁴

After providing a brief overview on the work of the committees since 1802, it narrows reform options down to two: either to espouse the metric system though

preserving traditional names or to generalise Lisbon measures across the realm with slight changes. The parliamentary committee judged the French system to be «complete» and «perfect». However, the 1814 committee had embraced, not the full-fledged French system of 1795, but a hybrid, which was neither the French «in all its features and denominations», nor did it keep most denominations in use, or refrain from introducing a new linear base unit under a new denomination, the «*mão travessa*». Moreover, that project had old denominations correspond to lengths very different from before. The committee took the following line: review the system proposed by earlier committees, remove denominations not consecrated by usage and approximate as much as possible lengths of homonymous denominations, old and new (that is, the length of the new *palmo* should approximate as much as possible the length of the old *palmo*), and also retain aspects of the old partition structure.¹⁰⁵ With regard to metrological policy, this represented an important compromise between progressive reform and tradition. This was as hybrid as the 1814 proposal, but it *was not* the 1840 project. The committee, a bit at odds with its own proposal, hesitated to give its final recommendation to the legislative body. This second-guessing sprang mainly from the completeness of the French system: uncompromising, almost perfect. The following quote, which anticipates Alder's comment on the leeway enjoyed by French *savants*, hints at its constraining consequences from the point of view of diffusion to other spaces and periods:

«French legislators enjoyed the most complete freedom when they put together their legal metric system; [such freedom] if it has enabled them, on the one hand, to give the system a most complete regularity and theoretical perfection [...] has been, on the other, one of the causes that have prevented its full espousal [...] in France».¹⁰⁶

After some reflection, the committee concluded, rather paradoxically, that its own project shared the vices of the 1814 proposal, hindrances so big as to «prefer the

thought of the external committee [1840], if conveniently developed ». The committee accepted the idea of basing the new linear standard on an unchangeable natural length. Technically, from that does not follow the choice of the metre: the new base unit could be in a known and finite relation with the metre (as with the old *vara*). Therefore, the committee suggested any of the following courses of action: i) implement the full-fledged metric system complete with original nomenclature; ii) deploy a version of the metric system, modified as to nomenclature and partition; iii) espouse the 1840 external committee plan. The project-bill eventually submitted by the committee embraced a version of the second option.¹⁰⁷

Probably, the report was not the best base to start with, in being too indecisive, and not pointing clearly which road to take. That might have been the point: keep as many roads open as possible, within the generally shared belief of the need to make measures uniform across the realm. However, being a parliamentary piece, the imprecise and half-hearted character of the proposal caused, in due time, difficulties.

When general discussion on the proposal began, the first deputy to make a substantive contribution was Silveira Pinto. He quoted Trigos at length, taking onboard many of his points and all of his historical explanations. All the way through he stressed the importance of differences among municipal standards. Such differences were crucial «to merchants who speculate upon the inequality of measures, from which they obtain sizeable interests, to the people's disadvantage». After all, he adds, «there is nothing more suitable to or more capable of begetting endearment or irritation than the interests of men».¹⁰⁸ He points to the lack of comparisons between old and new sets (often decreed but never actually done) as the main obstacle to standardization. He voted for the committee's project with some qualifications.

The next speaker to seize the full attention of his peers was the shrewd Rodrigo da Fonseca Magalhães, a political might of the centre-left. He started with subtle irony

by praising the depth of knowledge of previous speakers, the one for having elevated parliamentary thinking to «the high plateaux of mathematics», the other for having «opened the book of history from the first page to the last ». However, he feared for the project, «especially if we are unable to give anything more than praise and litanies». No doubt about the need to reform and to terminate the chaos. And the proposed system was surely the most perfect, «speaking in abstract». He chose to underscore the great many difficulties ahead. He said: «let us not approve everything good there is just because it is good; let us see if it is possible to establish that without inflicting grave inconveniences to the people.» Reforms with the scope of this

«[A]re usually undertaken either by governments governing absolute in all respects, that do not face nor admit resistances, or in occasions of generalized upheaval within the political system of nations in which people embrace everything new, irrespectively of those harmed, who dare not even raise their voices».¹⁰⁹

He spoke, obviously, of revolutionary France. Even there, the reform had faced huge obstacles, which had taken many years to «remove» He compares the reform with the extinction of convents and tithe, done in epochs of «overwhelming events». Indeed, in times of Liberal revolution. After all, changing a country's weights and measures is a serious issue, «almost as serious as changing its idiom». Change cannot just be decreed: «let us bear this in mind and let us proceed step by step, by teaching rather than commanding – persuading». For Rodrigo is, plainly, no naïve about people's aspirations, as he points to the inherent paradox: the people who complain the most about inequality in measures are the same ones who resist «almost invincibly» the reform. The once and future minister of the Interior is not far off the mark when concluding: «It is difficult to dislodge people's habits: habits are almost exclusively the arguments of their reasoning». He defends the adoption of a modified French system, retaining traditional names as a lesser evil. The new Greek-Latin terminology will solely serve to «confuse all ideas of length, capacity and weight. People will think it to

be a cabalistic language, or witchcraft». The new nomenclature ought to be taught in elementary schools. When those now exotic words actually come to «signify ideas», that is when the nomenclature will have become «familiar». At the end of the session the project was voted and approved.¹¹⁰

Detailed debate was scheduled to the next session, and began a few days later.¹¹¹ Article 1 establishes that weights and measures shall be uniform in all Portuguese states, mainland and overseas.¹¹² At stake was whether overseas colonies should adopt the new system at all, and, if so, whether at the same time as in the Metropolis. Some, like Silveira Pinto, thought it wise to leave the colonies aside for the moment, an opinion shared by the minister of the Navy and Overseas. Rodrigo da Fonseca, on the contrary, did not expect difficulties to increase by incorporating overseas territories because in the colonies «there are not as many interests, nor as varied and multiplied, nor as many transactions as in mainland Portugal; and in this issue obstacles are in direct proportion to the volume of transactions, and to the interests produced thereof».¹¹³ If timing is the question, let there be a more extended deadline for the colonies. Silveira Pinto replied, in essence, that if one admits that there will be difficulties in Portugal, then one must also admit that their sources are much more powerful in the colonies. The discussion continued at the next session, still on art. 1.¹¹⁴ A deputy from Macau intervened to say that in his constituency everything was going to be next to impossible. In Macau people would resist «because that is the proper character of China people», to resist out of national pride. Commerce in Macau is peculiar, he added, everybody is suspicious, all transactions are done in weight, and the measures in use in the Customs are the yard and the pound. Article 1 was approved.

Next came into discussion the article stating that the base of the legal metric system is the *vara*, equal to one-tenth of a million of the quarter of the meridian, i.e., the French legal metre.¹¹⁵ Rodrigo took the floor to reopen the basic issue. He agreed with a

uniform system, but why the metre as base unit? Why not, say, Lisbon's old *vara* as the 1840 external committee suggested? He was out of order, of course, as the President reminded him. Rodrigo wanted, in the event of a rejection of art. 2, to have a fallback position that would secure uniformity at the least, never minding if the base unit was the metre or the old Lisbon *vara*. Silveira Pinto, very active throughout but not a member of the committee, argued that the committee had been clear in its choice of metric system. If the base unit was not to be the *vara*, the French legal metre, then all previous works, manufactured standards and comparisons would have been in vain. He stressed that the existence of a finite relation between the old *vara* and the metre (new *vara*) would ease the establishment of the new system. As to why the metric system was preferable, he referred to its *civilizing element* and to how it would *smooth the progress of commercial exchanges*. Only *national resentment* prevented more countries from joining in. He then takes up Rodrigo's challenge and attacks the 1840 committee's proposal: it would not assure a systematic character to national metrology, because there is no relation between the linear base unit and the capacity and weight units; and because Lisbon measures have no base whatsoever in nature. If one wants to change things, one should be radical, or else it is better to do nothing at all. The 1840 project was limited by its weaknesses. The article was approved.

The next article concerned nomenclature, one of the hottest issues.¹¹⁶ Some deputies, like Castilho, defended strenuously the keeping of the original Greek-Latin «philosophical language». Others, whose exponents were Pinto and Rodrigo, defended, not exactly the merits of usual nomenclature but rather its necessity, for it would be counterproductive to insist on the «philosophical». Of course, both sides were also considering the nature and character of Portuguese people and their ability to undergo change. The arguments in favour of traditional nomenclature stressed the difficulties the new one had faced in France. Albano replied: «[Castilho] is perfectly aware that, in

spite of the utility of the scientific language, when one wants to extend to the people a language that will be hard for them to pronounce, and learn, it makes harder, and more difficult, the thing one wants to establish». Why add to foreseeable difficulties «exotic» and «cumbersome» names, he asked.¹¹⁷ Rodrigo countered Castilho's «abstract» reasoning with a reference to «practice»: practice is «the beacon which must guide legislators in matters administrative». He argued that scientific nomenclature is of little interest to the people, uniformity is what matters to them, and «the end of frauds and abuses triggered by inequality, the adulteration and forgery everywhere rampant».¹¹⁸ Moreover, a compromise version of the metric system with national nomenclatures had hitherto been the rule, as in Belgium. Rodrigo recalled that not even all Napoleon's might had been enough to do it in enlightened France: «should we not learn from that fact?»¹¹⁹

At last, deputy Miranda said out loud what many probably were thinking but dared not say. Given the events of the years to come, his words acquire a prophetic resonance.

«The people would be unforthcoming to any nomenclature other than the popular one; they would say that it was a foreign thing, and consequently, the difficulties the law would face in its implementation would be that much augmented [...] [it would be] a revolution in the country [...] it would be chaos, it would be, I would not dare to say a political revolution, but a subversion».¹²⁰

The cacique Vaz Preto, in his peculiar truculent tone, reasoned: you tell me people have trouble learning, but, he admonished his peers, «people can learn anything, let us not make them as ignorant as that, because they are not. [...] I vote for the scientific nomenclature, and let the people learn it».¹²¹ Two sessions later, still discussing art. 3, Silveira Pinto replied: «let us not try to make a philosopher out of every individual of the lower classes».¹²² Rodrigo entered the discussion once more to defend traditional names out of practical reasons, not for thinking it superior to the scientific nomenclature

(nobody did, actually): «as in France, we will have the thing, even if we do not have the words yet, which will be learned eventually»; «[otherwise] the consequence will be to lose the useful, because we did not want to espouse it without the beautiful which we could have done without».¹²³ The traditional nomenclature was approved.

Again and again, «the people» emerge as discursive objects poised between unsurpassable stubbornness springing from morbid ancient habit and a potential for citizenship yet to be fulfilled, as blueprints for individuals that not only could but actually should emancipate themselves from whatever and whoever was holding them hostage.

The remaining articles were approved without substantial changes and with relatively little discussion. The remainder of the project details the correct inscription procedures in accountancy, sets up district commissioners to oversee inspections and gauging, distributes extant standards in the Army Arsenal and conversion tables in the *Torre do Tombo* to municipalities, and sets up a deadline of two years for the beginning of implementation in mainland Portugal (no fixed deadline for overseas territories). The detailed discussion was concluded in the session of February 1, 1845. On the 22nd, Baptista Lopes sent to the House the «last wording» of the law, which was approved and sent to print.¹²⁴ Parliamentary procedures required the law to go to the House of Peers. In the Upper House, a special committee was formed by Francisco Tavares de Almeida Proença, Francisco Simões Margiochi, and the Viscounts of Vilarinho S. Romão, of Sá da Bandeira and of Oliveira. The committee was not able to reach a consensus, presenting in the session of 7-4-1845 one majority and two minority reports. These projects and amendments were neither discussed nor voted until the end of the 1845 legislative session, jeopardizing the entire legislative process because by 1845 the 1842-45 legislature was over and every project would have to be re-presented in the next legislature. But the next legislature was to be a protracted affair. From October

1845 until 1847 there was first a peasant rebellion so-called «*Maria da Fonte*» (1846) and subsequently a civil war (1847). Parliamentary work in both Houses was resumed only in 1848.

The committee's three reports are worth reviewing due to their importance in framing the next parliamentary discussion and the course chosen in 1852.¹²⁵ The Viscounts of Sá da Bandeira and Oliveira, and Almeida Proença authored the majority report. The need to make measures uniform across the realm was unquestionable. While approaching this particular reform, the legislator should – in their view – always bear in mind other countries' attempts, the practical complications triggered by «hard-to-die habits», and the mode in which governments have everywhere sought to «overcome [people's] repugnance».¹²⁶ From such tenets they deduced the need to proceed with caution. Because, they argued, the system about to be chosen was meant not only for the educated, nor for future generations alone, but also for the present-day generation, who «has habits that not even the legislator's might is capable of destroying, except by violence».¹²⁷ If not, the thing to do would be to embrace the French legal system in its entirety, but doing just that would be «committing a big mistake».

Once again, the French experience comes to the fore, but already in the guise of ready-made rhetorical *vulgata*. In France, the metric system had been struggling for decades against «the forces of inertia, prejudice and habit».¹²⁸ Not even all of Napoleon's energy allowed his government to skirt «compromising with the fierce resistance of the people», and that is the meaning of the 1812 retrenchment. Subsequent experience showed that resistance sprang not only from nomenclature, but also from the change in the ideas of length and weight traditionally associated with certain names. The 1812 law only added confusion to an already confused situation. Meanwhile, lest one think the committee was going nowhere with this line of reasoning, the full-fledged deployment of the metric system in France in 1845 was, admittedly, «everyday more of

a reality, but only at the expense of government's perseverance, of teaching in schools, and by its use in state institutions». ¹²⁹

If the French experience provided comfort in caution, another source was needed for a more proactive inspiration. In Great Britain, authorities also kept an eye on France and, assuming linear and weight measures to be uniform, decided to make uniform only capacity and agrarian measures by extending London standards (by Parliament Act of 1826). New standards would be made as close as possible to the measures already in place. After the fire in the Houses of Parliament, where the original standards were kept, British weights and measures were lost. Authorities had their hands free to design British metrology from scratch, much as academicians in revolutionary France, but in the absence of a revolution. What happened? A special committee was appointed and presented a report in 1841: in it, they opted to abandon entirely the idea of having a measuring standard whose base be derived from nature; instead, metal standards based on traditional measures ought to be manufactured, kept inside the walls of a major building in London, the capacity measure be derived from weight and the usual linear standard maintained. Thus, the committee reasoned, Britain, being the most industrialized, illustrated, commercial, and developed country in the world, had chosen to reform weights and measures in a way that «affected the least possible the general established usages». ¹³⁰ Why should Portugal do differently?

It is worth noting that the French and British examples invoked to support the non-espousal of the metric system could, in fact, be used to back the opposite conclusion. The French case showed that, *a contrario* to the committee's reasoning, success was, after all the toil, achievable. The devastating fire which had destroyed both the Houses of Parliament and British standards, creating a peculiar metrological *tabula rasa*, seemed to justify that much more a system based upon nature, a system which, by definition, could never be lost.

The committee's majority was hence bent on not adopting the metric system. It proposed a project whose paramount goal was to render measures uniform. Minimal change meant easier deployment, it was thought. Assuming the uniformity of the linear measure, it took as base unit the «*palmo craveiro*», renaming it «*palmo legal*». Again, holding to uniformity in weights, it kept the «*arrátel*». The tricky part, as ever, were capacity measures for liquids and solids because of their extreme variance. The committee chose the Lisbon «*canada*» and «*alqueire*» with minor changes.¹³¹ That is, the committee, emulating the British decision of 1841, opted pretty much for the plan sponsored by the 1840 external committee, of which Sá da Bandeira had also been a member.

Vilarinho S. Romão's proposal was, not surprisingly, similar to his 1833 project, which he had presented in the House of Peers in 1834.¹³² The novelty was to be found in the remarks he offered against both the Lower House proposal and the majority report. In his peculiar eccentric tone, S. Romão starts by exposing the erroneous value of the *vara*, of the *vara*'s relation with the metre, and of Lisbon capacity measures. This first line of dissent was clearly designed to undermine both projects' scientific credentials. A second line of reasoning sought to debunk the majority's project. He argued: «the history of our motherland shows us that the Portuguese people have an unsurpassable abhorrence to adopting Lisbon capacity measures, because they are too small».¹³³ Furthermore, the majority project lacked entirely the systematic character any *system* of weights and measures, such as the Roman or the French, he adds, should display. His own project sought to square the circle of science and social custom. The Lower House project was simply bad science; moreover, it collided head on with custom: «laws must not destroy ancient habits, which identify with customs and with language itself». The majority report, in wanting to keep with custom, chose the wrong custom to abide by – Lisbon's – and for that reason would doubtlessly be the cause of

«major disturbances in over two-thirds of our population». Lisbon measures were simply «very bad», as he expected to demonstrate later in the debate.¹³⁴

Finally, there was Margiochi's minority report.¹³⁵ In a nutshell, he proposed the French legal system, complete with Greek-Latin nomenclature. He departed, obviously, from the majority report, but also, and substantially, from the Lower House's project as the latter retained usual denominations and a binary and decimal partition. In favour of the metric decimal system, he offered the whole set of stock arguments (the only one able to satisfy the requirements of the science of the day and the one most capable of facilitating the progress of inner commerce and, via internationalisation, external commerce worldwide). However, that was not the issue at stake. As we can grasp from the debate thus far, almost nobody doubted the scientific superiority of the French metric system – in theory. In practice, trouble laid elsewhere, in implementation, and particularly in the sensitive issues of decimal structure and, above all, nomenclature. If practice was to be the beacon in administrative matters, as Rodrigo told his colleagues, Margiochi took his bearing from another guiding light: progressive optimism and an unwavering faith in the powers of enlightenment: «convinced that difficulties which seemed insuperable have often faced the adoption of reforms dictated by the most ardent and shrewd friends of humanity, which a constant and enlightened perseverance has finally been able to overcome, I think that, by a set of conveniently arranged rulings, we will be able to achieve the desired result».¹³⁶ Nevertheless, despite the rhetoric, his project contained a fallback conciliatory stance. In fact, it allows the government to fabricate *ad hoc* fractions or multiples of decimal standards if they were «generally in use in commerce or better suited to the service of the public» (art. 14) and to permit that the new weights and measures «be named by the names of current weighs and measures with which they have analogy, being those names preceded by the word =new=» (art. 15). What was really innovative in his project, and influential in the future

framing of the reform, was the creation of a specially appointed institution to oversee the deployment of the system and a specific article dealing with the teaching of the system. The project created a «Central Board of Weights and Measures» in the Interior, whose functions were detailed in arts. 3 and 4. These provisions were taken up almost *ipsis verbis* in ns. 1 to 4 of art. 14 of the 13-12-1852 law. Article 6 specifically requires a bill to make the teaching of the metric system compulsory and exclusive in schools, public or private, whatever instruction level, as well as in Academies.

The 1849 polemic between Silva Lopes and Franzini

After the end of the civil war in 1847, Silva Lopes was elected deputy to the 1848 legislature. Back in the Lower House in 1849, he renewed his initiative in the session of 9-3-1849.¹³⁷ In essence, he presented a similar project to that of the 1813 committee, departing from the 1843 project in some respects. Again, a special committee was appointed on 10-3-1849¹³⁸, which presented a new project on April, 11.¹³⁹ The debate was scheduled but the government failed to show and discussion was adjourned. Thus, the legislative session ended (18-7-1849) with no discussion. That same day a new government was in office and the whole scheduling procedure had to start over again. As we will see shortly, debate resumed in early 1850.

Meanwhile, Marino Miguel Franzini had published a lengthy «Considerations on the advantages that would be obtained from uniformity in weights and measures in this Kingdom».¹⁴⁰ Franzini had been a member of the 1840 external committee and had helped with the endless calculations required by conversion tables. Not surprisingly, he argues the case for the extension of Lisbon capacity standards. Where would Franzini start if not at the French Revolution?

«[The French Revolution] In wanting to achieve the optimum all of a sudden, faced a fierce and passive resistance from the people of that numerous and intelligent nation, dragging the adoption of the new system for almost half a century [...]. This

is invariably the outcome of violent innovations that wound individual habits and ideas, which, in spite of being commanded by energetic and even violent governments, come to a halt in the face of ancient and entrenched national habits that repel those momentous changes in the ideas received since infancy, thus frustrating Legislators' good intentions, which despise the good by immediately looking after the optimal [...]. In fact, the French government flattered itself by thinking this very rational and scientific system would be taken up all over Europe [...] however, this dream or utopia seems as difficult to achieve as it would be to establish a universal language for all peoples».¹⁴¹

The French case had taught «more prudent nations» the virtues of caution, he added. The overriding goal ought to be uniformity *within* each national territory, as supposedly Great Britain, Russia, Prussia and Naples had done. By comparison, Portugal would be in an advantageous position, since linear and weight measures were fairly uniform. Capacity measures «present the biggest disparities in every municipality, and even between parishes, displaying a true chaos that produces incalculable losses and frauds». He was paving the way for his central argument:

«It is therefore evident that with the keeping of our system only with the change in capacity measures, to be made equivalent to an appointed standard [Lisbon's], the marvellous outcome would be obtained instantly, and with no fuss, of generalising to the whole Monarchy a single system of weights and measures without confusing ideas, as would unfailingly happen if a system alien and with no relation whatsoever with the Country's traditions were adopted».¹⁴²

After ascertaining what he considered to be the salient advantages of the system he proposed, he went on to debunk the project then under consideration by the Legislative Body. The most noticeable shortcoming of the parliamentary proposal was to attribute old denominations to new measures. Confusion would follow in the minds of individuals who had been used, from birth, to associating certain names with certain quantities. Such innovations would surely produce widespread fraud in retail commerce, he added. Silva Lopes replied to Franzini's blitz a couple of months later.¹⁴³

It is now possible to fully appreciate the significance and purpose of Lopes' lengthy and well-documented memoir of 1849. On the one hand, being deeply committed to the reform, he sought to promote in the public eye the reform project he himself had authored and which was running a circuitous route in the Lower House. His memoir provided a comprehensive historical vision. He depicted the process as a protracted one, mired in advances and setbacks, then apparently reaching its decisive stage; a controversial process, dividing public opinion and politicians alike; a fragile process, in support of which no extra backing would be wasted. On the other hand, as he explained, there was the question of timing and intent: «[Franzini's] discourse would no doubt weaken the spirits of certain people, and trigger serious apprehensions in those of others, on the occasion of the debate of such a matter in the Legislative Body; and for that reason we decided to offer some considerations».¹⁴⁴ He then greatly elaborates his reply to Franzini before offering a detailed account of the 1849 parliamentary committee's project, which constitutes the remainder of the memoir. Let me briefly go over his reply before returning to the 1850 parliamentary debate.

Lopes began by stressing internationalisation. Following closely the reasoning of Valente do Couto¹⁴⁵, he argued that a country could no longer organize its weights and measures without considering international trade, and that the sharing of a uniform system would greatly enhance commercial exchanges. Search no further, such a system had been found, it was the metric system.¹⁴⁶ Next, he came to France. True, the metre had faced resistances there due to its «novelty» and to the «little education given to people». Subsequent wars did not create the necessary conditions to promote acceptance, namely the furthering of elementary instruction. From the moment peace was restored, Louis Philippe «wisely» decided to reinstate the metric system in 1840.¹⁴⁷ The dismembering of the empire left an important metric heritage, namely in Lombardy-Veneto, Holland and Belgium. On the Italian peninsula, the scientific

congresses of 1844 and 1845 had paved the way for the metric system; some kingdoms were already implementing it, such as Lombardy-Veneto, Sardegnna, and Piedmont. In Spain, the parliament had just passed a law (9-7-1849) espousing the metric system. In Saxony and Denmark, proposals to that effect were under way. According to his calculations, one-third of the European population, some seventy million people, had already gone metric.¹⁴⁸

He also criticised the extension of Lisbon's standards, for three main reasons: the arbitrariness of base unit, the lack of interdependence between weight and capacity measures and linear measures, and the many ways in which Lisbon standards were divided.¹⁴⁹ He then sought to demonstrate those standards were not that well known throughout the territory; in fact, «Lisbon standards are as well known in the customary usage of peoples as any other set one might wish to introduce, because any new set would be as different from the one in use as any other, and doubtless they could not care less whether the *almude* is divided into ten or twelve *canadas*».¹⁵⁰ Conversely, he argued, the metric system was not as foreign to the Portuguese as Franzini and others had suggested in Parliament. In some professions, namely in factories and some specialised manufactures, workers had been using decimal divisions for some time (the same was true in public works, in geodetic-topographic works, and in some Army departments, such as clothing). He submitted: «This system is being taught in every College and School in which lessons are given in the principles of arithmetic»¹⁵¹ – a flat lie from any standard of assessment. Next, he came to the crucial, intertwined questions of resistance and acceptance and of the extent to which such resistances should be in the legislator's mind when crafting the reform bill. A borderline issue was of course nomenclature. In France, the lack of preparatory works (namely, the production and publication of conversion tables) and – he concedes – nomenclature had hindered implementation. That is why the proposal suggested traditional names be kept. The

Dutch, the Belgians, and the Italians had done just the same. He then offered his closing remarks:

«We acknowledge that the introduction of any innovation always faces hardships and difficulties, all the more when it comes to weights and measures. However, with constant and enlightened perseverance we will be able to overcome those encumbrances as other Nations which embraced the Metric-Decimal System have. In the state of disorder and confusion that mires the Kingdom's weights and measures, we must not be frightened by fears that the proposed change might be less than welcome by the people [...]. Therefore, it is imperative to conclude once and for all an affair that is being dealt with in our country for almost half a century without reaching a practical result [...]. [§] [...] thus, it is convenient to choose a system that satisfies every prerequisite of the sciences, that is the more adequate to facilitate our inner and external trade; and no other system hitherto presented has fulfilled better those requirements than the Metric-Decimal System».¹⁵²

The 1850 parliamentary debate

In the 1850 legislative session, yet another special committee was appointed.¹⁵³ The committee drafted a reform proposal (15-2-1850), which entered debate in the Lower House a fortnight later.¹⁵⁴ The first deputy to take the floor was, as five years before, Silveira Pinto. This time a vocal member of the committee, Pinto addressed right away what would become the main topic of discussion: the project's timing, or «opportunity», in light of recent Portuguese political history and of Europe's «1848». Absolute necessity created the ripe moment to reform; moreover, other countries, such as Spain, had recently joined the metric club. However, from the time strong resistances were to be expected, the issue of timing acquired another, more important sense. The implementation of the law ought not to «cause the slightest apprehension, whichever the political circumstances of the country, I repeat: whichever they are. That is an eventuality for which the government must have the necessary force, and if it has not, then...then, I do not know...»¹⁵⁵ And then, clarifying:

«This provision might engender some turmoil, it may be used by those bent on revolutions, yes Gentlemen, it can; we should count on it, revolutionaries will take

advantage of this weapon, and manhandle it, I would not say dexterously, but treacherously, deceitfully [...] to help revive amongst us, I dare not say the already dead *Maria da Fonte*, but some *Manuel do Rio* that can still be made to be born». ¹⁵⁶

Here it was, then, a key-issue that would hallmark the debate. Portugal had experienced a major peasant rebellion, the so-called «*Maria da Fonte*», triggered, amongst other factors, by the government's decision to reform direct taxes introducing the proportional apportioning system. The rebellion lasted for the better part of 1846, acquiring political connotations until it finally morphed into a civil war that no party wanted to win, concluded by international intervention in 1847. From the legislator's point of view, «the people» had shown their ability to rebel against even fair, equitable and enlightened policies. The crushing of the «Peoples' Spring» all over Europe in 1848 gave the government a feeling that the revolutionary hydra had been tamed, thus providing breathing space for the Constitutional Monarchy to assert itself, no longer torn between the twin menaces of absolutism and leftist radicalism. The peasant rebellion-to-civil war sequence worked, for some, as a strawman to be usefully waved, for others, as an overriding concern. It is very interesting to assess the deputies' stances *vis-à-vis* «*Maria da Fonte*» as a potent symbol of what *they*, the people, might do if not adequately drilled beforehand. Almost none of the deputies failed to go over the subject.

Lopes de Lima recalled the «docility of the Portuguese people in embracing such innovations, when they are to their profit». ¹⁵⁷ Fontes Pereira de Melo, the future centre-right prime-minister and a dominant political figure between 1852 and 1886, disagrees with the project, even if he will vote for it in general. Fontes' position can hardly be more important since he was to become the minister of Public Works in December 1852, when the metric system finally was adopted. In contrast to most of his colleagues, Fontes does not agree the traditional nomenclature should be kept, and favours Greek-Latin names. Terminology is an integral part of a superior system and should therefore not be adulterated, he offers. The «scientific terminology» sought to achieve a character

unchangeable by history, the same way as the metre being based upon nature sought immutability, therefore a sort of immunity from history or, as it were, «revolutions of man». The metric system complete with nomenclature symbolizes the fight of the universal against the particular, the victory of permanence over transience of things human, of the solidness of the natural over the frail and ephemeral social. If the project kept the nomenclature, then it would be timely, if not late. This kind of reforms «are either done in the midst of a revolution, or need to be thoroughly thought out and supervised».¹⁵⁸ He disagreed strongly with the projected three-year deadline. He would later suggest a twenty-year transition period, accompanied by a strong investment in schooling. For, if the reform was going to cause major commotion, as he thought it would if traditional nomenclature and a short deadline were kept, then the project would *ipso facto* be «most ill-timed» and unwelcome.

Fontes' intervention triggered a discussion of deadlines. Xavier da Silva stressed the importance of deadlines in connection with people's customs and the potential for rebellion: «[I] still have very present what happened in the year of 1846 with the proportional apportioning system, a very advantageous measure, adopted in other Countries, and therefore want to proceed with extreme prudence, and will not be the one urging the government to go and try its forces to know whether it is strong enough to make the reform accepted [...] we ought to bear in mind peoples' customs [...] we ought to show them the way».¹⁵⁹ The deadline to be set must reflect this prudence, he concluded.

Silveira Pinto intervened to clarify his previous statement regarding the risk of revolutions: «there are men who cannot live without their *little revolution*; others think revolution is actually a nourishment for social reform and the true point or the true axis around which social machinery should rotate; and I think just the opposite; I like revolutions carried out from the office».¹⁶⁰ Costa Cabral, reinstated in the presidency of

the Council of Ministers, a politician against whom the rebellion and the civil war had arguably been fought, shows his contentment that both sides of the House agree on the need to make measures uniform, and thus urges deputies to approve the project in general and leave comments about deadlines to the detailed debate. The government considered the reform to be «indispensable».¹⁶¹

The debate went on in the next session with a string of deputies intervening. J. J. de Melo stressed that such an innovation would attack the customs and beliefs of peoples, hence resistance ought to be expected, and the latter «is born out of individuals' wounded interests, because nowadays there are a lot of individuals that go buy where measures are bigger, and then go sell where they are smaller».¹⁶² This deputy made the connection between expected hardships and the promise of economic modernity the system holds, pointing out that the mechanism of price formation will change. He called for longer deadlines. Fontes indicated that he preferred Margiochi's project to the committee's. A number of deputies made interventions not really adding new substance or depth to the debate: calling for lengthier deadlines or for the need to educate the people in connection with resistances, or asserting their agreement with the need to render measures uniform. The project was approved by the session's end.¹⁶³

Detailed discussion began in the next session of the Lower House.¹⁶⁴ Article 1, setting uniformity, was approved with no debate. Article 2, establishing the *vara* as base unit, was next. This was, as in 1845, the opportunity to talk about the reform in general. The arid debate focused on whether the *vara* should be defined as «equal to the French legal metre» (that is, equal to a material object) or as equal to one ten-millionth of the quarter of the meridian, that is, a mathematical relation involving a geophysical object. The latter length was only apparently equal to the first. The House decided for the French legal metre.

Lopes de Lima took the floor to commend the project's good timing: «the major advantage is having everything ready or almost ready; having comparisons done for 35 years; and having standards for almost the whole kingdom».¹⁶⁵ Subsequent reform of administrative limits reducing the number of municipalities created a perfect fit. Fontes attacked the project for its timidity, arguing its deployment would unleash more inconveniences than that of the complete metric system. He returns to the French 1812 law to come to a conclusion opposite to that his peers had been drawing: when the legislator compromises with the people's habits the sole result is more confusion. The 1837 return to scientific nomenclature in France showed Portugal the path to follow. He declares himself once again in accordance with Margicocchi's 1845 proposal, in spite of too short a deadline. In fact, Fontes strenuously defends the extension of deadlines and the immediate teaching of the system in schools. To create familiarity was his goal, otherwise «this new system – established all of a sudden – is an excellent base to speculate a revolution upon».¹⁶⁶

Lacerda came to Fontes' aid in the next session¹⁶⁷, praising scientific nomenclature as one of «the system's greatest beauties».¹⁶⁸ People's ignorance can be overcome by education and by extending deadlines to at least 1855: «the clinging to old ways and customs [...] weights very little to those who know our docile people, so malleable by nature, so susceptible to learning whatever one is able to teach them».¹⁶⁹ The original nomenclature is «simple» and «easy»; anarchy would rather flow from what the committee proposes; moreover, countries with which Portugal enjoys trade relations all opted for the original nomenclature (Spain, France, and Piedmont). At the end of the day the French legal metre was approved.

Art. 4 set on traditional nomenclature with little discussion. Little discussion in the moment of approval contrasted with a prolonged discussion earlier in the day, and in the general debate. Positions were already clear; the House had made up its mind on the

subject. The next relevant article was n. 6, defining the deadline for the distribution of new standards to municipalities: 6 months, the project stated. Many defended extended deadlines and tended to conceptualise the issue very much in articulation with elementary schooling, and, interestingly, with a further decrease in the number of municipalities. § 2 of art. 6 contained a provision commanding the teaching of the new system in elementary schools. Article 6 was approved.

Art. 7 set deadlines for public departments and state contracts (1-1-1851) and private citizens (1-1-1853). The committee presented an amendment, changing deadlines to 1-1-1852 and 1-1-1856, respectively, optionally allowing the government to phase the law by districts. The new public deadline was approved (§ 1, art. 7). Some voices disagreed with the geographical phasing of the law; some still considered deadlines too tight. Xavier da Silva argued there was no need for phasing since, once the system was established in a district, say Lisbon, neighbouring districts maintaining commercial relations with it would follow out of necessity, and in this way the system would expand. It did not occur to the deputy that, considering the lack of a nationwide market already in place at the time of the system's deployment, the system would hardly extrapolate the confines of regional markets. Nevertheless, the capital's centrality in regulating commercial fluxes, even if insufficient to unify the national economy, was more than enough to trigger enormous implementation problems if, as would later happen, the capital's wholesalers and retailers did not start using the new system. Neighbouring municipalities, but also far away districts linked to the capital via fluvial commerce and land routes, would feel no incentive to take up the new system. And if one added Porto to Lisbon in not adopting the system, then there would be no reform whatsoever. Eventually, the combined centrality of the capital and the absence of a nationwide market (slowly emerging all along the second half of the century) mounted obstacles. As with France, it is hard to discriminate causal dynamics between

the protracted formation of a nationwide market and the success of a shared, uniform system of weights and measures. Each one seems to be a condition of the other. Ken Alder is probably right in suggesting that the issue at stake was the need of a change in individual economic rationality: the ability to frame economic transactions by reference to abstract terms of exchange, i.e. market price, via the use of a shared system of communication (weights and measures), itself abstracted from the object being measured and from the labour put into its production.

The remainder of the project was quickly approved in this and the next session, including articles regulating private contracts, prohibiting the sale of any standard other than the metric and setting attending fines, authorizing the government to spend monies in the production of standards to carry out comparisons in overseas territories.¹⁷⁰ The detailed discussion was concluded in 5-3-1850. In the session of 13-3-1850, the final draft of the law was presented and approved by the Lower House¹⁷¹ and sent to the House of Peers.¹⁷² The House of Peers was never to report on the project. In April 1851 a military coup overthrew the government.

* * *

I will close this section with a critical analysis on the sources of the 13-12-1852 law. I found in the Archive of the Ministry of Public Works a manuscript copy of the 1845 Margiochi project. An unidentified author annotates the copy throughout. Next to the annotated project there is a handwritten note addressed to the Prime Minister. The manuscript project is an integral copy of the bill presented by Francisco Margiochi in his minority report to the House of Peers. Apparently, from its archival location next to the oldest documents in the Archive's section concerning weights and measures, left by the Board of Weights and Measures, it is part of the working materials used to craft the December, 1852 law. Consider the following:

Art. 15: «The Government is hereby authorized to allow, in the cases it deems convenient, the new weights and measures to carry the names of present day

weights and measures with which they have an analogy, being these preceded by the word =new=». ¹⁷³

Comment: «And I think that without this article the system does not implant itself (old donkey does not take a new road). [...] what difficulty can there be in saying that someone will be obliged these *alqueires* of the new measure corresponding to those *alqueires* of the old. It ought to be thus that the people will easily mould themselves». ¹⁷⁴

The comment twists Margiochi's declared intentions: in fact, he supported the scientific nomenclature, and only added art. 15 in order to secure a fallback position. It is peculiar that the commentator picks up a secondary article as the most important from the viewpoint of a desired successful implementation. The commentator was surely someone who, while generally agreeing with the metric reform, had strong convictions on the issue of traditional nomenclature. Now, there is a lead to who the commentator might be. There is a handwritten anonymous note, physically laying next to the project, addressed to the Prime Minister, Duke of Saldanha, and dated 13-10-1851.

«[p. i] I now send you enclosed the project on Weights and Measures: it is very simple; it leaves to the Government all latitude to push forward, slowly and successfully, the introduction of the new system. In this aspect, it resembles what was done in Spain. [§] The setting up of a permanent Board of Weights and Measures is very important. To this Board [p. ii] the director of geodetic works (Folque) and a member of the Academy of Sciences must be appointed; the other can be a tenured professor of the Polytechnic School, for example. [§] It is necessary that when the dictatorship is over, the government has done something that can be permanently useful. [§] One, it is this I hereby create; the other, is the gradual abolition of slavery, to which I again direct your Excellency's attention.» ¹⁷⁵

The reading of the text establishes that this note accompanied the annotated reform project and that its author was the minister of the Interior. That position was then held by Rodrigo da Fonseca Magalhães. If we recall Rodrigo's position on the use of the original nomenclature, we see the comment fits well with the opinions he voiced in the 1845 debate in the Lower House (in 1850 he was already a Peer). However, the 1852

law takes an altogether different stand, for it espouses a version of the metric system complete with nomenclature, whereas the author of the comments holds the keeping of traditional nomenclature to be very important, decisive even. The 1852 law is far more radical than any of the projects presented to the Houses of Parliament in the 1840's. Now, if one recalls the debate, the politician most vocal in upholding the full-fledged system complete with nomenclature was Fontes Pereira de Melo. The Ministry of Public Works, in which the December, 1852 law located the Board of Weights and Measures, was created in late August 1852, and Fontes was its appointed minister.

Hence, this brief analysis of sources indicates the author of the comments on Margiochi's project to be Rodrigo da Fonseca Magalhães, at the time minister of the Interior, in a preparatory phase of the reform, or the crafting of the final wording of the law. However, the politician whose imprint is recognizable in the uncompromising character of the 13-12-1852 law was the minister of Public Works, Fontes Pereira de Melo. He had been the sole deputy to explicitly speak in favour of Margiochi's project, criticizing only what he perceived to be too tight deadlines. The 13-12-1852 law extends deadlines substantially (ten years, the double of the 1845 project), coinciding almost point-by-point with Fonte's positions in the 1850 parliamentary debate.

Conclusion

It is interesting to reflect on how Portuguese politicians perceived and evaluated their room to manoeuvre, their *degree of freedom*. French academicians and politicians, the Portuguese deputies said, enjoyed a magnitude of freedom unavailable to them. Many Portuguese politicians voiced concerns that the reform would trigger social unrest, a revolution even. In France, the trigger had been the Revolution itself, allowing for radical metrological reform. Too much, too soon, as the 1812 «compromise with the

people» revealed, at least to some. Quite the contrary, as 1837 seemed to make clear for others.

A view of society as composed of individuals no longer bounded by ties of ascription was increasingly shared. Sociology, the emerging science of the modern industrial society, would soon confirm this suspicion. Eugene Weber's peasant, in order to become a Frenchman, had to undergo Karl Polany's great transformation. Individuals who could be taught could emancipate themselves from their previous hostage condition to become full citizens in the Liberal contract society. As such, they were conceptualised as an endless receptacle of reformism. Individuals' thoughts, bodies, gestures and behaviour slowly emerged as an immense field for intervention. Hence, elementary education became a crucial tool of government, revealing to parents their false consciousness and to public authorities the measure of the challenge ahead.

In France, the field for reform had been cleared like a *tabula rasa*: freedom, no tradition, no encumbrance from pre-existing practices, individuals malleable like clay and the «tyranny of formulas». Probably not, but let us admit that as historical *vulgata* to be used for rhetorical purposes. In Portugal, at least in parliamentary discussion, there was an acute awareness of traditional practices and usages and of the danger of formulas. Portuguese reformers and legislators did not perceive their landscape in terms of *tabula rasa*. On the contrary, they felt their freedom was limited; they felt the need to be prudent and cautious.

In the acute awareness of the importance of practices and experience one may perhaps already start to perceive a fundamental change in the way of conceptualising reform: from law-making and normative discussion to a concept of implementation stressing the need to mobilize, to make a heterogeneous set of actors converge in the production of a desired effect: acceptance, thus compliance. But how was this to be done?

A change in the normative frame of action is seldom enough to bring about change in social practices and usages, particularly those deeply embedded in the routine lives and bodies of people – like traditional measuring standards and associated economic and social behaviour. It is very difficult to decree a change in the set of people's dispositions or in what one might call their *habitus*.

It is interesting to note that most memoirs I presented dealt with the issue of normative change. Every memoir sought to ascertain the «good doctrine» in metrological matters, i.e., to establish a correct normative standpoint. Which system is the best and which is worth of the century's *lumières*? To be able to define what «best» and «worthy» meant was halfway to gaining legitimacy, hence supremacy, over competing metrological options. That is why the issue of the origins of the Portuguese traditional system was so important, that is why the putative authorship of Pedro Nunes was so heatedly debated, that is why the ability to hook up with nature was crucial (both as a natural base and as a discursive object), that is what both sides read into the «French case» – completely opposite signs and contradictory conclusions.

However, as the sheer amount of attention dedicated to it in both parliamentary discussions shows, although, for obvious reasons, more evident after 1846-47, there was a heightened awareness that the people would not accept the new system on normative grounds only. Although the issue will be explored in depth in chapter IV, one can already outline a provisional conclusion: in order to provoke such a change it is not enough to change the normative, it is necessary to change the normal. To change implies a re-conceptualisation of what normality is, be that in the use of the new metric system or in the economic practices of individuals.

Notes

¹ Anonymous [Timóteo Verdier], «Memoria sobre as Medidas e o Peso de Portugal comparadamente com as Medidas e o Peso da França, transcripta do Observador Luzitano em Paris, emendada e accrescentada pelo autor», *Annaes das Sciencias, das Artes e das Letras*, t. v, 1819 (emphasis in the original).

² Ken Alder, «A Revolution to Measure: The Political Economy of the Metric System in France» in M. Norton Wise, dir., *Values of Precision*, Princeton, Princeton University, 1995, pp. 39-71, here p. 41.

³ Alder, «A Revolution ...», op. cit., 1995, p. 48.

⁴ Stuart Woolf, «Statistics and the modern state», *Comparative Studies in Society and History*, 31 (3), July, 1989, pp. 588-604; Jean Claude Perrot and Stuart Woolf, *State and Statistics in France 1789-1815*, London/Paris, Harwood Academic Publishers, 1984; Jacques Revel, «Knowledge of the territory», *Science in Context*, 4 (1), 1991, pp. 133-161; Jacques Revel and André Burguière, *L'Espace français*, Paris, Seuil, 1989.

⁵ Alder, «A Revolution ...», op. cit., 1995, pp. 48-49.

⁶ Maurice Crosland, «'Nature' and measurement in eighteenth-century France», *Studies on Voltaire and the Eighteenth-Century*, 87, 1972, pp. 277-309, here pp. 289-292.

⁷ Crosland, «'Nature' ...», op. cit., 1972, p. 294.

⁸ Crosland, «'Nature' ...», op. cit., 1972, p. 308.

⁹ Ken Alder, *The Measure of All Things: The Seven-Year Odyssey and Hidden Error that Transformed the World*, New York, The Free Press, 2002; Alder, «A Revolution ...», op. cit., 1995, pp. 51-53.

¹⁰ Alder, «A Revolution...», op. cit., 1995, p. 53.

¹¹ Law 2-12-1812 and *Arreté* 28-3-1812 .

¹² Alder, *The Measure...*, op. cit., 2002, p. 69.

¹³ Johann Heilbron, «The measure of Enlightenment», in Tore Frangsmyr, Johann Heilbron and Robin Rider, eds., *The quantifying spirit in the eighteenth century*, Berkeley, University of California Press, 1990, pp. 207-242.

¹⁴ Witold Kula, *Measures and Men*, Princeton, Princeton University Press, 1986.

¹⁵ E. P. Thompson, «The Moral Economy of the English Crowd in the Eighteenth Century», *Past & Present*, 50, 1971, pp. 76-136.

¹⁶ Alder, «A Revolution...», op. cit., 1995, p. 43; Eugene Weber, *Peasants into Frenchmen: the Modernization of Rural France (1870-1914)*, Stanford, Stanford University Press, 1979.

¹⁷ Alder, «A Revolution...», op. cit., 1995, p. 59.

¹⁸ Alder, *The Measure...*, op. cit., 2002, pp. 126-127.

¹⁹ Ronald Zupko, *Revolution in measurement: Western European weights and measures since the Age of Science*, Philadelphia, American Philosophical Society, 1990, p. 162.

²⁰ Decree 17-10-1812. The Committee was headed by João António Salter de Mendonça, minister of the Interior and of Finance, and staffed by João Pedro Ribeiro, Francisco Ribeiro Dosguimarães and Francisco Manuel Trigo de Aragão Morato. In 1807, when D. João VI and the court fled to Rio de Janeiro, escaping the invading Junot's army, a set of «Governors of the Kingdom» was appointed to the regency by Royal Decree and Instructions of 26-11-1807. It took a revolution to hasten the king back to Lisbon, in 1821, to swear the newly crafted Liberal Constitution.

²¹ Richard Bonney, «The Eighteenth Century. II. The Struggle for Great Power Status and the End of the Old Fiscal Regime» in Richard Bonney, ed., *Economic Systems and State Finance*, Oxford, Clarendon Press/European Science Foundation, 1995, pp. 315-390, here p. 315.

²² Quote from João Pedro Ribeiro, Francisco Ribeiro DosGuimarães, Francisco Manuel Trigo de Aragão Morato, *Representação da Comissão dos Foraes, acerca da necessidade e conveniência de uniformisar os pesos e medidas em todo o Reino*, 18-11-1812 reprinted in João Baptista da Silva Lopes, *Memoria sobre a reforma dos pezos e medidas em Portugal segundo o systema metrico-decimal*, Lisbon, Imprensa Nacional, 1849, pp. 1-9 appendix, here p. 5.

²³ *Representação...* in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 5-6, appendix.

²⁴ *Representação...* in Lopes, *Memoria sobre...*, op. cit., 1849, p. 6, appendix.

²⁵ *Representação...* in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 6-7 appendix.

²⁶ *Representação...* in Lopes, *Memoria sobre...*, op. cit., 1849, p. 7 appendix.

²⁷ «Plano para a igualdade dos pesos e medidas próprio dos grandes conhecimentos e luzes do século, devbaixo de um systema geral com base sólida e permanente».

²⁸ Ministerial ordinance, 29-12-1812.

²⁹ Lopes, *Memoria sobre...*, op. cit., 1849, pp. 7-8.

³⁰ The report was signed by Anastácio Rodrigues, Mateus do Couto, Costa Neves, Francisco Travassos, João Bell, Aragão Morato, João Pedro Ribeiro, Francisco Dosguimarães, Mendo Trigo de Aragão Morato and Araújo Travassos, but with three votes against, by Costa Neves, Araújo Travassos, and Bell. See Lopes, *Memoria sobre...*, op. cit., 1849, p. 9 for reasons.

- ³¹ Joaquim Henriques Fradesso da Silveira, *Relatorio ao Ill.^{mo} Sr. Antonio de Serpa Pimentel ministro e secretario de Estado dos negocios das obras publicas, commercio e industria por...*, Lisbon, Imprensa Nacional, 1859, p. 19.
- ³² «Among all the systems invented thus far, the only one which contains all prerequisites expressed in the Royal Aviso [5-12-1812] is undoubtedly the Metric-decimal system», Lopes, *Memoria sobre...*, op. cit., 1849, p. 11 appendix.
- ³³ Lopes, *Memoria sobre...*, op. cit., 1849, p. 11 appendix.
- ³⁴ *Almude, alqueire, pinta, jarda, and marco de Colónia*, for example.
- ³⁵ Lopes, *Memoria sobre...*, op. cit., 1849, pp. 12-13 appendix.
- ³⁶ Cf. the Portuguese tradition, according to which liquids were measured by the *almude* and *canada*; whilst solids were measured by the *alqueire* and *moio*.
- ³⁷ Cit. in *Plano da Comissão...* [2-2-1813] in Lopes, *Memoria sobre...*, op. cit., 1849, p. 18 appendix.
- ³⁸ *Plano da Comissão...* [2-2-1813] in Lopes, *Memoria sobre...*, op. cit., 1849, p. 18 appendix.
- ³⁹ *Plano da Comissão...* [2-2-1813] in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 20-23 appendix.
- ⁴⁰ *Imediata Resolução* 22-8-1814 and *Royal Aviso* 12-9-1814 in Lopes, *Memoria sobre...*, op. cit., 1849, p. 10.
- ⁴¹ *Royal Aviso* 20-12-1814.
- ⁴² Lopes, *Memoria sobre...*, op. cit., 1849, p. 10.
- ⁴³ *Royal Aviso* 23-12-1814 to the Junta da Fazenda of the Army Arsenal.
- ⁴⁴ Sebastião Francisco do Mendo Trigo, *Memoria sobre os pesos e medidas portuguezas, e sobre a introdução do systema métrico-decimal*, Lisbon, Oficina da Academia Real das Ciências, s/d [1815].
- ⁴⁵ Trigo, *Memoria...*, op. cit., 1815, p. 3.
- ⁴⁶ Trigo, *Memoria...*, op. cit., 1815, pp. 3-4.
- ⁴⁷ Trigo, *Memoria...*, op. cit., 1815, p. 5.
- ⁴⁸ Trigo, *Memoria...*, op. cit., 1815, pp. 32-33.
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- ⁵⁰ Trigo, *Memoria...*, op. cit., 1815, p. 66.
- ⁵¹ Trigo, *Memoria...*, op. cit., 1815, p. 83.
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- ⁵³ Lopes, *Memoria sobre...*, op. cit., 1849, p. 11.
- ⁵⁴ Timóteo Verdier, «Memoria sobre os Pesos e Medidas portuguezas comparadas com as francesas», *O Observador Luzitano em Pariz ou colecção literaria, politica e commercial*, t. I, January-May, 1815, pp. 516-549.
- ⁵⁵ Verdier, «Memoria...», op. cit., 1815, p. 519.
- ⁵⁶ Verdier, «Memoria...», op. cit., 1815, pp. 520-522.
- ⁵⁷ Verdier, «Memoria...», op. cit., 1815, pp. 543-544.
- ⁵⁸ *Royal aviso* 5-12-1815.
- ⁵⁹ *Parecer da Comissão sobre os papeis remettidos pelo Encarregado dos Negócios em França*, 13-12-1815 in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 27-41 appendix.
- ⁶⁰ Lopes, *Memoria sobre...*, op. cit., 1849, p. 29, appendix.
- ⁶¹ Lopes, *Memoria sobre...*, op. cit., 1849, p. 29, appendix.
- ⁶² Detailed reasons for this assessment in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 30-31, appendix; see also Trigo, *Memoria...*, op. cit., 1815.
- ⁶³ Lopes, *Memoria sobre...*, op. cit., 1849, pp. 31-35, appendix.
- ⁶⁴ Lopes, *Memoria sobre...*, op. cit., 1849, p. 37, appendix.
- ⁶⁵ Law 2-12-1812 and *Arreté* 28-3-1812.
- ⁶⁶ See arguments in *Royal Aviso* 12-7-1816.
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- ⁶⁸ Anonymous [Verdier], «Memoria sobre as Medidas e o Peso de Portugal comparadamente com as Medidas e o Peso da França, transcripta do *Observador Luzitano em Pariz*, emendada e accrescentada pelo autor», *Annaes das Sciencias, das Artes e das Letras*, t. v, 1819, pp. 32-73.
- ⁶⁹ Anonymous [Verdier], «Memoria sobre as Medidas e o Peso...», op. cit., 1819 [=1815], p. 116.
- ⁷⁰ Anonymous [Verdier], «Memoria sobre as Medidas e o Peso...», op. cit., 1819 [=1815], pp. 99-100.
- ⁷¹ Sebastião Francisco do Mendo Trigo, «Memoria sobre as Medidas Portuguezas, em resposta ao que sobre este assumpto vem escripto no n. 4 do *Observador Lusitano*, e no terceiro Volume dos *Annaes das Artes*» in *Annaes das Sciencias, das Artes e das Letras*, tomo VII, 1820, pp. 26-49.
- ⁷² Trigo, «Memoria sobre as Medidas...», op. cit., 1820, pp. 30-31.
- ⁷³ Trigo, «Memoria sobre as Medidas...», op. cit., 1820, pp. 34-41.

- ⁷⁴ Trigo, «Memoria sobre as Medidas...», op. cit., 1820, p. 41.
- ⁷⁵ Report dated 13-12-1815, in Lopes, 1849, pp. 27-41, appendix.
- ⁷⁶ *Ofício da Comissão participando os trabalhos que havia feito*, 12-8-1818, cit in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 45-46, appendix.
- ⁷⁷ Trigo, «Memoria sobre as Medidas...», op. cit., 1820, p. 42.
- ⁷⁸ Ministerial ordinance 20-5-1817.
- ⁷⁹ Lopes, *Memoria sobre...*, op. cit., 1849, p. 17.
- ⁸⁰ *Ofício da Comissão participando...*, doc. cit., Lopes, *Memoria sobre...*, op. cit., 1849, pp. 45-46 appendix.
- ⁸¹ Royal Aviso 12-7-1816.
- ⁸² Royal Aviso 27-2-1819.
- ⁸³ The governors of the kingdom saw fit to appoint João Pedro Ribeiro, Francisco Ribeiro dos Guimarães, Francisco Manoel Trigo de Aragão Morato, Sebastião Francisco do Mendo Trigo, Francisco de Paula Travassos, Mateus Valente do Couto, Alexandre António Vandelli, and Francisco Nunes Franklin, under the headship of the Charters Committee's President, João António Salter de Mendonça. In Lopes, *Memoria sobre...*, op. cit., 1849, p. 18.
- ⁸⁴ Lopes, *Memoria sobre...*, op. cit., 1849, p. 19, note 1.
- ⁸⁵ Entitled «Brief Exposition of the Metric-Decimal System», the pamphlet was authored by Valente do Couto and published by the Imprensa Régia in 1820.
- ⁸⁶ The same argument was put forward by Morato, member of the original committee, in Francisco Manuel Trigo de Aragão Morato, *Memórias de...começadas a escrever por ele mesmo em princípios de Janeiro de 1824 e terminadas em 15 de Julho de 1835, revistas e coordenadas por Ernesto de Campos Andrada*, Coimbra, Imprensa da Universidade, 1933, here pp. 91-92.
- ⁸⁷ Committee to Government, 28-8-1823, cit. in Lopes, *Memoria sobre...*, op. cit., 1849, p. 22.
- ⁸⁸ The Committee was composed of Francisco de Paula Travassos, António Lobo de Barbosa Ferreira Teixeira Gyrão, and Francisco António de Campos.
- ⁸⁹ Ministerial ordinance 7-3-1827.
- ⁹⁰ Decree 24-8-1833.
- ⁹¹ The committee was thus staffed: Minister of the Interior, president; Manuel Ribeiro de Araújo, vice-president; Mateus Valente do Couto, Luis da Silva Mousinho de Albuquerque, Manuel António Velez Caldeira, José Feliciano da Silva Costa, Marino Miguel Franzini, António Lobo de Barbosa Ferreira Gyrão, and Francisco Nunes Franklin (secretary).
- ⁹² António Lobo de Barbosa Ferreira Teixeira Gyrão (1st Viscount of Vilarinho de S. Romão), *Memoria sobre os pesos e medidas de Portugal, sua origem, antiguidade, denominação, e mudanças que tem soffrido até nossos dias, bem como a reforma que devem ter. Acompanhada de varia tabellas de redução ou comparação de todas as medidas e pesos do mundo conhecido, antigas e modernas, com as actuaes de Lisboa. Para uso do Commercio, para a intelligencia dos historiadores e geographos antigos e modernos*, Lisbon, Imprensa Nacional, 1833.
- ⁹³ Gyrão, *Memoria...*, op. cit., 1833, p. 38.
- ⁹⁴ Gyrão, *Memoria...*, op. cit., 1833, p. 25.
- ⁹⁵ Ministerial ordinance 8-1-1840.
- ⁹⁶ «Informação do Sr. Matheus Valente do Couto» in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 48-55 appendix.
- ⁹⁷ Lopes, *Memoria sobre...*, op. cit., 1849, p. 48 appendix.
- ⁹⁸ Lopes, *Memoria sobre...*, op. cit., 1849, pp. 51-54 appendix.
- ⁹⁹ AA.VV., *Relatório acerca do projecto de lei para se igualarem no Reino de Portugal os Pesos e Medidas, apresentado na Câmara dos Senadores pela Comissão Externa encarregada da proposta do referido projecto*, Lisbon, Imprensa Nacional, 1840.
- ¹⁰⁰ *Relatorio acerca...*, op. cit., 1840, p. 10.
- ¹⁰¹ See text in *Diário da Câmara dos Deputados* [DCD], session 3-2-1843, pp. 28-29.
- ¹⁰² *Diário do Governo*, n. 109, 11-5-1843 and n. 114, 17-5-1843.
- ¹⁰³ DCD, session 20-1-1845, pp. 14-28.
- ¹⁰⁴ *Diário do Governo*, n. 109, 11-5-1843, pp. 798-800.
- ¹⁰⁵ The new *palm* was still one-fifth of the new *vara*, see summary table in *Diário do Governo*, n. 109, 11-5-1843, p. 800.
- ¹⁰⁶ *Diario do Governo*, n. 109, 11-5-1843, p. 799.
- ¹⁰⁷ *Diario do Governo*, n. 109, 11-5-1843, p. 800.
- ¹⁰⁸ DCD, session 20-1-1845, p. 23.
- ¹⁰⁹ DCD, session 20-1-1845, pp. 26-27.
- ¹¹⁰ All quotes from DCD, session 20-1-1845, pp. 27-28.
- ¹¹¹ DCD, session 24-1-1845, pp. 12-15.
- ¹¹² Art. 1, *Diario do Governo*, n. 109, 11-5-1843, p. 799.

- ¹¹³ DCD, session 24-1-1845, p. 12.
- ¹¹⁴ DCD, session 25-1-1845, pp. 4-13.
- ¹¹⁵ Art. 2, *Diário do Governo*, n. 109, 11-5-1843, p. 799.
- ¹¹⁶ Art. 3, *Diário do Governo*, n. 109, 11-5-1843, p. 799.
- ¹¹⁷ DCD, session 25-1-1845, p. 11.
- ¹¹⁸ DCD, session 25-1-1845, p. 12.
- ¹¹⁹ DCD, session 27-1-1845, p. 6.
- ¹²⁰ DCD, session 25-1-1845, pp. 12-13.
- ¹²¹ DCD, session 25-1-1845, p. 13.
- ¹²² DCD, session 28-1-1845, p. 4.
- ¹²³ DCD, session 28-1-1845, p. 7.
- ¹²⁴ *Diário do Governo*, n. 51, 1-3-1845.
- ¹²⁵ See projects in *Diário do Governo*, n. 102, 2-5-1845.
- ¹²⁶ Committee's majority report in *Diário do Governo*, n. 102, 2-5-1845, p. 473.
- ¹²⁷ Committee's majority report in *Diário do Governo*, n. 102, 2-5-1845, p. 473.
- ¹²⁸ Committee's majority report in *Diário do Governo*, n. 102, 2-5-1845, p. 473.
- ¹²⁹ Committee's majority report in *Diário do Governo*, n. 102, 2-5-1845, p. 473.
- ¹³⁰ Committee's majority report in *Diário do Governo*, n. 102, 2-5-1845, p. 473.
- ¹³¹ See details in *Diário do Governo*, n. 102, 2-5-1845, pp. 473-474.
- ¹³² Gyrão, *Memoria...*, op. cit., 1833.
- ¹³³ Vilarinho de S. Romão, *Diário do Governo*, n. 102, 2-5-1845, p. 474.
- ¹³⁴ Vilarinho de S. Romão, *Diário do Governo*, n. 102, 2-5-1845, p. 474.
- ¹³⁵ Francisco Simões Margiochi, *Diário do Governo*, n. 102, 2-5-1845, pp. 475-476.
- ¹³⁶ Margiochi, *Diário do Governo*, n. 102, 2-5-1845, p. 475.
- ¹³⁷ *Diário do Governo*, n. 59, 10-3-1849, p. 292.
- ¹³⁸ Committee members: Agostinho Albano da Silveira Pinto, Bernardo Gorjão Henriques, Bernardo Miguel de Oliveira Borges, Francisco José da Costa Lobo, Inocêncio José de Sousa, Jerónimo José de Melo, João Baptista da Silva Lopes, Joaquim de Albuquerque Caldeira, and José Silvestre Ribeiro. See *Diário do Governo*, n. 60, 12-3-1849, p. 297.
- ¹³⁹ DCD, session 11-4-1849, p. 88. Also in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 71-78.
- ¹⁴⁰ Marino Miguel Franzini, «Considerações acerca das vantagens que resultariam da uniformidade de pesos e medidas neste Reino», *Diário do Governo*, n. 112, 14-5-1849, pp. 583-584.
- ¹⁴¹ Franzini, «Considerações acerca das vantagens...», op. cit., 1849, p. 583.
- ¹⁴² Franzini, «Considerações acerca das vantagens...», op. cit., 1849, p. 583.
- ¹⁴³ João Baptista da Silva Lopes, «Reflexões sobre as *Considerações das vantagens que resultariam da uniformidade dos pesos e medidas neste Reino*, publicadas pelo Sr. Franzini no *Diário do Governo* n. 112, de 14 de Maio deste anno», *Diário do Governo*, n. 166, 17-7-1849, pp. 890-891.
- ¹⁴⁴ Lopes, *Memoria sobre...*, op. cit., 1849, p. 44.
- ¹⁴⁵ Mateus Valente do Couto, «Informação do Sr. Matheus Valente do Couto» in Lopes, *Memoria sobre...*, op. cit., 1849, pp. 48-55 appendix.
- ¹⁴⁶ Lopes, *Memoria sobre...*, op. cit., 1849, p. 45.
- ¹⁴⁷ Law 4-7-1837.
- ¹⁴⁸ Lopes, *Memoria sobre...*, op. cit., 1849, pp. 46-49.
- ¹⁴⁹ Lopes, *Memoria sobre...*, op. cit., 1849, pp. 52-55; also Lopes, «Reflexões...», op. cit., 1849, p. 890.
- ¹⁵⁰ Lopes, *Memoria sobre...*, op. cit., 1849, p. 57.
- ¹⁵¹ Lopes, *Memoria sobre...*, op. cit., 1849, p. 60.
- ¹⁵² Lopes, *Memoria sobre...*, op. cit., 1849, p. 63.
- ¹⁵³ Members: João Baptista da Silva Lopes, Jerónimo José de Sousa, António Luís de Abreu, Augusto Xavier da Silva, Agostinho Albano da Silveira Pinto, Inocêncio José de Sousa, and Bernardo Miguel de Oliveira Borges.
- ¹⁵⁴ DCD, session 26-2-1850, pp. 253-264. See also Lopes, *Memoria sobre...*, op. cit., 1849, pp. 71-79; see similar table in Trigoso, *Memoria...*, op. cit., 1815.
- ¹⁵⁵ DCD, session 26-2-1850.
- ¹⁵⁶ DCD, session 26-2-1850.
- ¹⁵⁷ DCD, session 26-2-1850, p. 255.
- ¹⁵⁸ DCD, session 26-2-1850, p. 257.
- ¹⁵⁹ DCD, session 26-2-1850, p. 258.
- ¹⁶⁰ DCD, session 26-2-1850, p. 259.
- ¹⁶¹ DCD, session 26-2-1850, p. 261.
- ¹⁶² DCD, session 27-2-1850, p. 265.
- ¹⁶³ DCD, session 27-2-1850, p. 270.
- ¹⁶⁴ DCD, session 1-3-1850, pp. 3-9.

¹⁶⁵ DCD, session 1-3-1850, p. 5.

¹⁶⁶ DCD, session 1-3-1850, p. 7.

¹⁶⁷ DCD, session 2-3-1850, pp. 11-23.

¹⁶⁸ DCD, session 2-3-1850, p. 12.

¹⁶⁹ DCD, session 2-3-1850, p. 12.

¹⁷⁰ DCD, session 5-3-1850, pp. 34-41.

¹⁷¹ DCD, session 13-3-1850, p. 153.

¹⁷² DCD, session 29-5-1850.

¹⁷³ Manuscript copy of Francisco Simões Margiochi, *Projecto de Lei*, ms., 6 fls., x pp., 7-4-1845, DGCAM-RC 36. *Documentos respeitantes á Comissão Central de Pesos e Medidas sobre a organização e divulgação do Sistema Nacional de Pesos e Medidas*, 1851-1859, AHMOP.

¹⁷⁴ Handwritten comment on art. 15 of Margiochi, *Projecto de Lei*, ms., 6 fls., x pp., 7-4-1845, DGCAM-RC 36. *Documentos respeitantes á Comissão Central de Pesos e Medidas sobre a organização e divulgação do Sistema Nacional de Pesos e Medidas*, 1851-1859, AHMOP.

¹⁷⁵ [Anonymous], [addressed by the minister of the Interior Rodrigo da Fonseca Magalhães to the Duke of Saldanha (prime-minister)], ms., 13-10-1851, 4 fls., iv pp, DGCAM-RC 36, *Documentos respeitantes á Comissão Central de Pesos e Medidas sobre a organização e divulgação do Sistema Nacional de Pesos e Medidas*, 1851-1859, AHMOP.

Part II

The machinery of the state in the process of becoming modern

(1852 to ca. 1878)

Map-making, fieldwork and statecraft

*The parasol I received from Lieutenant
Pego was worn out and the 4th of this
month, a day of a stronger north wind, one
of the stretchers and the cloth's rod broke
down – they are in need of repair.*

Salema Garção, 1857

In the quote, geodesist Garção is reporting back to his superior on something – a parasol – that broke down in his field equipment and needs repair.¹ This banal event of a micro magnitude nonetheless contains a crucial hint. It points to the micro foundations of macro processes, such as statecraft and science making. In the following chapter, I will endeavour to fill in the empirical space between the parasol and the state. Most crucial aspects of state-making are already contained in the quote. «Statecraft» refers to the intermediations through which the parasol gets to be repaired. If the state does not achieve some measure of success in repairing the parasol we cannot talk about state formation at all. Or, better put: parasol and state, «micro» and «macro», are not really different things; they are the same as seen through different analytical glasses.

What was lieutenant Garção doing? He was engaged in fieldwork, charged with the reconnaissance of a portion of terrain. He had to perform a number of technological (say, measurements) and social (say, hiring workforce) tasks. He was but a cog in a larger bureaucratic machinery put in place to survey the kingdom in order to produce a certain object, endowed with specific features and trusted with high hopes: a medium-scale chorographic map, the *Carta Chorographica* at the scale of 1/100 000. In the next section, I shall look at the emergence of an altogether new cartographic policy. Within

half a century, this policy produced major outcomes in the form of maps, the most important of which was the aforementioned *Carta*.

Policy and institutions: giving cartography a framework

The first cartographic programme came into being, as we saw in Chapter I, out of the original 1788 decision and of a set of administrative ideas put together and fine-tuned by the end of the eighteenth century. It came into being, but was only consolidated after 1834. All along the first half of the century, programme development suffered greatly from an insufficient degree of institutionalisation of geodetic works.² By 1848, the programme was «agonizing».³ The model of development followed thus far was exhausted. The convergence with the cadastre policy, in 1849, proved decisive for a rigorous definition of what the Topographic Map should be.⁴ In the last years of the decade, the setting up of a strong link between the Topographic Map and the planned geometric cadastre had allowed the Board to grow, and to function in a more orderly manner. However, the relationship was asymmetric: topography was subordinate to the cadastre. Given the increasing despondency towards geometric cadastre after 1850, topographic works slowed their pace and eventually stopped altogether in 1851. When it became clear the government did not want to set up the cadastre, the relationship of subordination emptied the weakest pole (topography) of content. In order to survive, the Geodetic Board had to reorder its set of strategic relations. And so it did.

The political regime which came out of the April 1851 military coup, led by the Duke of Saldanha, embodied the second coming of the «Regeneration» to Portuguese political mores, and put an end to three decades of more or less continuous civil war. The period 1834-1851 can aptly be described as the «reign of the phrase and the gunshot»⁵ or «everyone's war against everyone else».⁶ The winner of the 1832-34 civil

war against absolutist «*Miguelismo*», the Liberal alternative, though hegemonic, had been less than consensual. This conferred the period its distinctive imprint of near-endemic confrontation between different political «partialities», triggering an unending series of palace-coups, popular uprisings, military *pronunciamientos*, and civil wars.⁷ In fact, issues like the origin and legitimacy of power, the consolidation of political decision-making and the governing line of action of the state were long in want of a solution, all the while nurturing protracted and bitter struggles.⁸ The Regeneration regime lived up to its name and settled many of these problems, overcoming the foundational issues of the twenties' «First Liberalism».⁹

Benefiting from unusual political stability, the first «Regeneration» cabinet (1851-56) fostered the country's economic development, namely the setting up of road, railroad and fluvial communications.¹⁰ The implementation of such a policy required the *mise au point* of instruments of territorial knowledge that would help in the design of the communications network to-be. The government struggled with the lack of statistic and cartographic data with which to plan such a vast programme of material improvements.

«The construction of communication infrastructures and the transportation industry give rise to extremely interesting economic issues, though little studied in their application to our country; neither could it have been otherwise because the beacon that illuminates them, statistics [...] is still lagging behind amongst us; and if figures, which appraise the true worth and importance of social facts, are lacking, on the other hand, the Kingdom's geographical and physical description is still very far from being able to assess, in the designing of inner thoroughfares, the advantages to be obtained and the sacrifices to be made [...] This shortage of data, felt in road planning and construction and in the designing of railway tracks, is felt above all in the improvement of navigation routes [...] The lack of topographical and geological charts, levellings and meteorological and hydrological observations, is known to all. This want is acutely felt in all engineering projects».¹¹

The fact that railroad companies were compelled to produce their own maps is a good sign of the scarcity of reliable cartographic information. In 1855, engineer Rumball complained: «distances are determined according to my own experience, over 65 km of road rigorously measured by the time it takes a horse to complete one km [...]. The notorious inaccuracy of published Portuguese maps obliged me to adopt this method».¹² In 1860, railroad engineer Wattier, working on the East line, wrote: «the remarks I am about to offer on the Alentejo area [...] would be more complete and accurate had I at my disposal even a mediocre map of Portugal; however, extant maps of Portugal are of an inaccuracy one cannot imagine. Had I not travelled and studied the terrain by sight, I could not have obtained even a mediocre knowledge of the country».¹³

The Ministry of Public Works was created on August 30, 1852 from the macrocephalic Ministry of the Interior.¹⁴ Public Works unmistakably embodied the *ethos* of the Regeneration regime. According to the decree's report, the Interior's labyrinthine inertia hindered the modernizing thrust the government wanted to imprint on public affairs. In terms of the administrative apparatus' morphology, Public Works confirmed the progressive specialisation and branching out of public administration into several different ministries, and general-departments within each ministry, each one of these overseeing a specific domain of activity – a relative novelty in bureaucracy – such as agriculture, mining, roads, railroads, ports, and so forth.¹⁵

Throughout the first Regeneration cabinet, cartographic works accrued and deepened the institutional dynamic set in motion in 1849. Profiting from a prolonged cycle of civil rest and political stability, thus at last enjoying an available territory, the Board was better organized. The early 1850's were a decisive epoch in the institutional history of Portuguese cartography. The constraints the «board» format posed to the proper institutionalisation of geodetic works, whose effects were being felt since late

1840's, were never so pressing as in 1851, when the first-order network was nearing completion and the survey of the topographic sheets was beginning, or should begin. The service's haphazard evolution had already pushed director Folque to enumerate, in April 1848, a set of conditions for their continuation in an orderly manner. Let me recall them: monies in the annual budget; construction of six first-order pyramids per year; buying of instruments; deployment of six drawing boards in fieldwork; timely payment of officers' disbursements; the organization of service instructions.¹⁶ In each and every one of these respects, matters improved as the 1850's marched on.

The 1852-Cartographic Programme spelled out

As we have seen in Chapter I, Folque had set the general guidelines of a chorographic chart for the first time in October 1851. It was to be surveyed at the scale of 1/100 000 and backed up by geodetic networks and represent the planimetry of water lines, hills, river basins, towns, main roads and thoroughfares, the coastline and the border. Administrative districts would be used as survey units, in which the limits of municipalities and civil parishes would be depicted. Thus conceived, the map would provide the basis for both a territorial reform bill and for planning communication and transport infrastructures.¹⁷ In the context of the Regeneration, the *new cartographic policy* would be instrumental to the application of the development policy, by propping the management of the territory and the overall design of communication and transport infrastructures.

Public Works endorsed the chorographic map as outlined by Folque in 1851. A couple of ordinances defined the features of the Chorographic Map, providing a first and clear picture of what the map should be, technically and politically.¹⁸ As a sort of justification for the policy followed in the previous two decades (now, «suddenly»

discontinued), the ordinances stated that the Chorographic Map was to be surveyed *instead* of the Topographic Map. The former was unmistakably connected with advances in public transportation. For instance, the ordinances direct the survey to follow the lines of direction of the royal roads Lisbon/Porto, Lisbon/Santarém, Aldeia Galega/Elvas by Montemor, Barquinha/Coimbra by Tomar, Coimbra/Viseu; and subsequently along the lines connecting major cities, military fortresses, and major rivers basins. The tight relation between surveys and main road and railroad projects is readily apparent if one compares the areas surveyed first, and with priority, for the Map and the lines of direction of the nascent road and railroad network, in the 1850's and 1860's.¹⁹ Furthermore, it is not by chance that the same day the lines of direction for the survey were published another Public Works' ordinance set the (generally similar) lines of direction for the «Northern Railroad» line.²⁰

The Chorographic Map was a compromise signed under the banner of urgency and economy. In retrospect, Folque acknowledged that much.²¹ At the outset, a crucial equation had to be solved by the Board's head in order to make survey as swift as possible without detriment to the necessary rigour. November 1852, Folque pondered that if first and secondary triangulations were to be used as basis for parcelled cadastre and topographic map they ought to be determined with the utmost perfection; however, considering the rapidity and the scale of the Chorographic Map, triangulations «could [...] do without the same rigour, and not compromise the precision of the Map at this scale». With this «lightening» in observation and calculation methods one would get «a great shortening of the deadline».²² This idea passed on unchanged to the preamble of the ordinance which defined the Map survey: considering the small scale, triangulations might not evince the rigour of high geodesy, topography or cadastral operations; this lessened rigour would translate into quicker survey; also because «observations and

calculations could be repeated with all rigour later, when one proceeds to survey maps at the scales 1/1 250, 1/2 500, 1/5 000 and 1/10 000».²³

Programme development: institutionalisation

Legal framework

In 1852, cartographic «works» were put under Public Works' direct dependence, which in itself did not change their institutional outlook. A Public Works' ordinance, following closely Folque's advice to the minister,²⁴ turned the Board into the General Department of Geodetic, Chorographic and Hydrographic Works, and divided it into three sections.²⁵ A Geodetic Depot was set up for the storage of instruments, maps, and assorted graphic works. The change in the organizational form of the institution made it possible to purchase instruments, to increase survey resources and, especially, to solve the «puzzle» presented by the reciprocal adjustment between several different necessities (monies, personnel, instruments, regular payment of stipends). In a number of important ways, 1856 helped to redress the blockages diagnosed in 1848.

In 1859, the organization of the Council of Public Works had been postponed because it was still awaiting the setting up of a Civil Engineering Corps, at the time non-existent.²⁶ The Corps was created in October 1864 and charged with all Public Works' technical services, including a section charged with geographical, statistical and weights and measures²⁷, later to be formally organized as the General Department of Geography, Statistics and Weights and Measures (*Direcção-Geral dos Trabalhos Geographicos, Estatísticos e de Pesos e Medidas*), which was composed of three different sections: the *Instituto Geográfico* (Geographic Institute), the *Repartição de Estatística* (Statistics Department) and the *Repartição de Pesos e Medidas* (Department of Weights and Measures). The General Department was in charge of «every study and

operation concerned with the physical and economic description of the realm, including high and little geodesy, chorography, topography, hydrography, statistics, cadastre, meteorology, weights and measures and any analogous that seem convenient.»²⁸ By creating the General Department, the government evinced a clear notion of geographic information issues. It ambitiously integrated into a single civilian public organism the administration of all information-gathering activities on the territory and the population, including the one charged with the 1864 population census²⁹, as well as economic activities. This arrangement was very similar in political conception and institutional outlook to the Spanish, in the wake of the Territory Measurement Law of 1859, and subsequent transformation of the *Comission de Estadistica General del Reino* into the *Junta General de Estadistica*.³⁰

The rationale behind the separate organization of the Military Archive in 1849 and that of the Geographic Institute in 1864 conveyed a clearly «civilian» vision of cartographic information. Portuguese cartographic authority ought to be civilian, in line with a view of the utilisation of maps, and of geographic information generally, as a strategic tool and political instrument of government. Since 1849, the Portuguese cartographic authority had been lodged in a «civilian» ministry and served a «civilian» purpose (although staffed almost exclusively by military). In 1849, the military had experienced a landslide defeat in the struggle to control the instruments of cartographic information (they lost cadastre, base geodesy and topography). Obviously, the Army did not stop survey operations, namely extensive route surveys.³¹ Such was one of the major arguments put forward in the bill of December 23, 1868, which fused the Geographic Institute and the Military Archive into the General Depot of War: to prevent extant duplications and overlaps.³² Even if not explicitly referred in the report, the clearly «militaristic» nature of this set of reforms is enhanced by the extinction of the Civil

Engineering Corps, also in 1868.³³ The General-Staff and the scientific Corps of the Army and Navy would staff the Depot in exclusive; the financing ran, paradoxically, on behalf of the ministries of War, Navy and Public Works.³⁴

The bill of December 18, 1869, passed by the Duke of Loulé's new centre-left cabinet, completely reversed the previous year's legal framework. The General Depot and the Engineering Archive were extinguished. All service specialities returned to Public Works to form the General Department of Geodetic, Topographic, Hydrographic and Geological Works.³⁵ The extensive report preceding the bill justifies the need of reliable large-scale maps with the urgency of reforming the fiscal and administrative apparatus and the «organization of the fiscal system, the solution of the great questions of transport and those concerning the regimen of waters, agricultural needs, rural economy and public hygiene, statistics and so many others».³⁶ Herein was signalled with crystal clarity the return to a «civilian» concept of cartographic policy. Moreover, the report continues, «most maps drawn for civilian usages are of little interest in matters concerning the state's defence. Men of war glance through them and file them, but they do not have for them the same importance of reconnaissance maps, neither can they make up for military topographic maps». Geodetic, topographic and hydrographic charts *«have as main purpose to serve the needs of public administration, companies and private persons»*.³⁷

Monies

The financing of map-making was a rather complex affair. The logistic and technological nature of operations and the protracted training of officers made it expensive; the requirement of precision and rigour made it slow; the absence, as late as 1848, of a clearly autonomous institutional structure and the haphazard transition from

the military to the civilian administration, in 1849, made it inefficient; all combined, these factors hindered a clear perception of the necessity and employment of monies. In his *Memoir*, Folque assessed the state of operations as «agonizing».³⁸ In 1848, he had set as a condition for the continuation of works that the government would provide a specific installment in the state budget.³⁹ At that time, operations ran under the Royal Engineering Corps. For resources, the Board depended from the Ministry of War, the will or generosity of the minister, the relative affluence of the ministerial budget or the importance the minister attached to the Board's activities. Well, in 1848, War refused to pay for the Board's expenses and this was the near cause for said report. The lack of resources hindered the humblest work programme and Folque painted the picture black.⁴⁰ Such a description caused the desired effect. The Lower House, following a War Committee proposal, approved a sum for the 1848/49 budget.⁴¹ The next year, one of the first decisions of the Commission of the Parcelled and Topographic Cadastre was to advise the government to restructure geodetic works, implying the transition to Interior, the increase in personnel and the buying of instruments. War resisted, both actively and passively, this defeat in the control over base cartography. The conflict between Interior and War provoked a standstill in fieldwork until summer 1849. July 1849, a bill from the Houses gave the government 11 046\$00 for geodetic, cadastral and topographic works for the year 1849/50.⁴² From then on, there was always a budgeted sum available every year, as Graph n. 1 shows.

Graph n. 1
Effective expenditure in Geodetic Works
 (Fiscal years 1848/49 to 1909/1910)



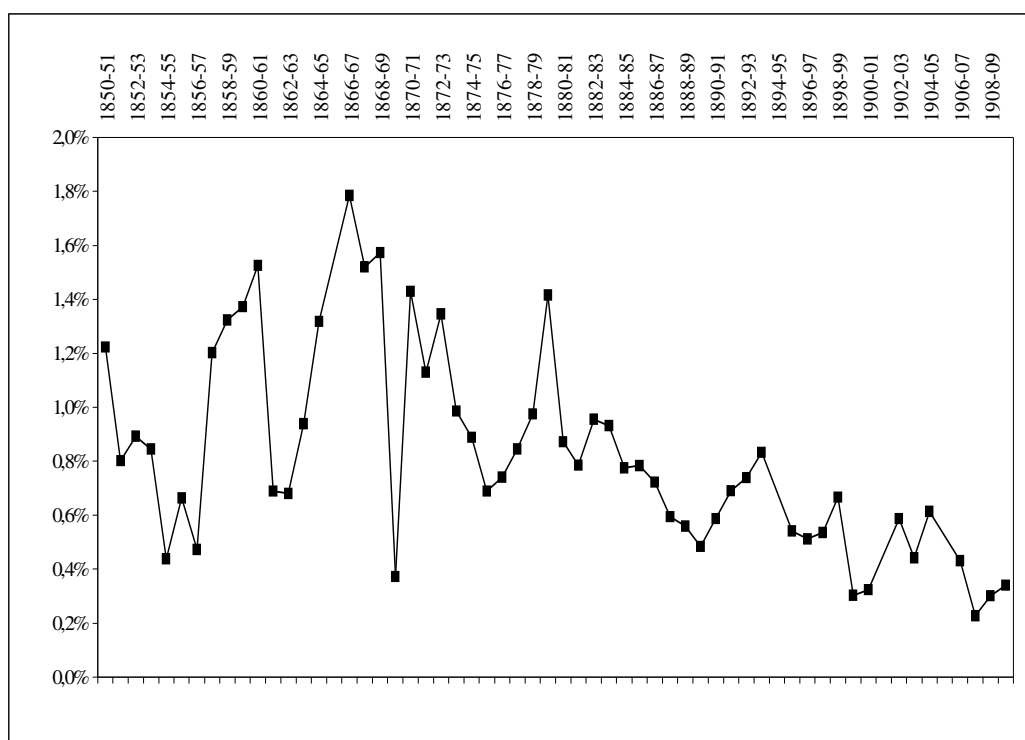
Source: Branco, 2003: 51.

The effective expenditure Geodetic Works in the period 1848/49 to 1909/10 can be divided in sub-phases: (1) sustained growth, from a lower initial level, between 1848/49 and 1866/67; (2) high level, between 1866/67 and 1899/1900, with a couple of fluctuations: a negative one (1866/67 to 1872/73), the other positive (1872/73 to 1879/80, year of the maximum in the considered period); (3) abrupt decrease and levelling at lower level, between 1899/1900 and 1909/10, with a historical low in 1900/01 for the post-1856 period.

Graph n. 2

Relative weight of Geodetic Works in the Public Works' budget

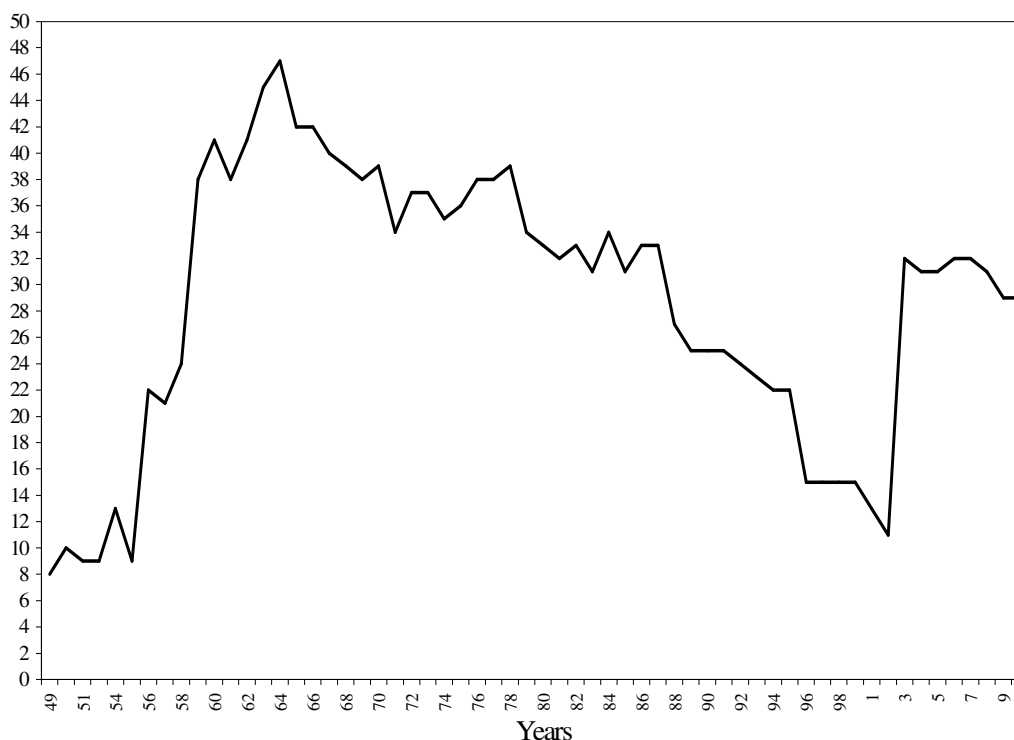
(Fiscal years 1850/51 to 1909/1910)



Source: Branco, 2003: 51.

The weight of Geodetic Works in the overall expenditure of the Public Works⁴³ never exceeded 2%. It increases from the beginning of the 1850's, in a continuous manner, until it peaks in 1866/67 with 1.8%. From then on, it starts to progressively loose weight, due to two interrelated factors: on the one hand, the fact that expenditure in Geodetic Works stayed at the same level or, after 1898/99, decreased in absolute terms; on the other hand, to the fact that the expenditure in Public Works increased significantly throughout. From the mid-1880's, the relative weigh of geodetic works decreases continuously until it reaches an all-time low point by the end of the period, with 0.2%.

Graph n. 3
Cartographic Works' Personnel
 1849 to 1910



Source: Branco, 2003: 66.

The period I will be looking into more closely, 1850 to 1870, was the heyday of the Department in terms of personnel volume. The average number of officers per year was 35. The need to push ahead several different projects, though with the undisputed importance of the *Carta Chorographica*, required a sizeable number of personnel, which was, particularly after 1856, in fact, hired. The all-time peak was reached in 1865 with 48 officers. As different service specialities left the Department throughout the 1870's and 1880's numbers decreased accordingly.

Personnel

Prior to 1856, the Board had never really been staffed with more than a few officers, ranging from six to twelve. The fieldwork mode, then as later, was that of a brigade composed by one or two officers and a set of army privates or other sort of workers. The number of privates varied according to the number of officers.⁴⁴ When the Board relocated to Interior, in 1849, 8 officers staffed it. Such a number was clearly

insufficient to carry on the survey of the topographic map. This is why, in 1848, Folque demanded the Board be staffed in a way that made it possible, not to survey the topography, but to survey the first-order network. As one can see from the graph above, numbers rose steadily after 1856 to survey the Chorographic Map, and then the Geographic Map, in conjunction with the hydrographic personnel and geological survey (from 1859). From 1849 to 1870, the General Department hired 64 officers. From 1879 onwards, numbers decreased as a result of a conjunction of causes leading to an all-time historical low by the century's turn.

Codification

The institutionalisation of geodetic works can also be seen in the standardization of «practical scientific procedures». This point is important for showing the two-way exchange between actual practice and the stabilization of scientific knowledge. Usually, historiography overlooks the importance of «scientific bureaucracies» as locales where scientific knowledge is produced. The standardization was apparent in two kinds of bureaucratic artefacts: Field Instructions (*Instruções de Serviço*) and Service Dictionaries (*Dicionários de Serviço*).

Field Instructions were attempts to codify and systematize technical, disciplinary and behavioural procedures. They cover the following topics: first- and second-order triangulations; construction of pyramids; measurement of angles and distances; topographic survey; accountancy; officers' duties; and proper handling of instruments. Several editions of the Instructions were published between 1850 and 1874.⁴⁵ The transition of engineers' training from a mostly theoretical component to fieldwork was mediated by a sort of «how-to codes», in which ambiguities or alternative modes of methodologies were narrowed down and the best practice or method was sought and

consecrated. Field Instructions were important in the institutionalisation of geodesy and cartography, both as disciplines and as bureaucracies.

Service Dictionaries sprang from the will to improve an aspect already dealt with in the Instructions: the best way to keep fieldwork daybooks. The first such Dictionary dates from 1851.⁴⁶ Dictionaries are a piece of administrative technology designed to improve functional performance, much the same way a logarithmic table increases the velocity of trigonometric calculus. The Dictionary's aim is to optimise work, make it more efficient, and make its results easily known, compared and assessed. For method, it uses codification and standardization, by which each task (or «service speciality» in the administrative argot) is subject to an analytical process through which it is decomposed into further elementary moments or sub-tasks.⁴⁷ Each one of these is assigned a code number or label⁴⁸; and to each of the labels corresponds a period of time (days, hours) of officers' work or a certain quantity of measurements (number of angles observed, for instance). Folque exemplifies: «for example, (7) = 5 stands for measuring 5 field points in the General Triangulation Minute; (53) = 2 h signifies that it took two hours to come and go from the headquarters to the geodetic sign».⁴⁹

These *little tools of knowledge* host two different institutionalising pulses: a scientific discipline applied through a set of standardized procedures and a discipline exerted towards the institutional organization of a service. In both of them, rules, best practices, courses of action, rights and duties are laid down; through them the administrative power springing from the scientific bureaucracy is powerfully amplified.

The mangle of cartographic practice

A summary of geodetic map-making

The simplest description possible of a geodetic network is to portray it as a set of physical objects called «pyramids» or «signals» built in order to help survey the terrain. A web of mathematical calculus interconnects these points. In geodetic-based maps, as in any other map, a point can be comprehensibly described (i.e., located) by three coordinates: x , or distance to the meridian; y , or distance to the perpendicular; and z , the vertical distance to the average level of seawater.

In the formation of such a network the first thing to do is to determine the coordinates' point of origin, located at the Royal Astronomical Observatory, in S. Jorge Castle, Lisbon, by connecting this point with an international frame of coordinates, to which every national network is referred. As before, two quadratic coordinates and a vertical one define this «connection». The x and y of the observatory are determined by astronomical observation, and are framed with respect to global system of coordinates defined by the Equator (latitude) and the Royal Observatory in Greenwich, London (longitude). The accurate value of z was achieved by the accumulated readings of a tide-gauge located in Cascais, thirty-odd kilometres west of the mouth of the river Tejo. The network links the point of origin (Lisbon) with the farthest topographical feature that can be transposed to a geodetically based map (mainly a function of the scale of the topographical survey); and, on the other hand, with London, first, and with the Earth itself. The origin of the coordinates is the point to which every other point in the network refers. The next step is to expand from this initial point, forming what is called a «first-order network». When it was concluded, in 1865, the network comprised 131 pyramids (see Map n. 3; see table «Construction and repair of geodetic signs»). In between themselves, the signals form triangles with up to 30 kms of side.

According to the positivist credo of modernizing cartographers and politicians alike, Portugal existed «out there», in the terrain, but did not exist yet, as it were, with any reliability, in map form. It was hard to «transport» Portugal to, say, a diplomatic conference gathered to draw international borders. How could one wage war without knowing one's own battlefield? How could one design a railroad or a tunnel? How could the government know the distance between cities, or the altitude of mountains, or the breadth of river basins? The practical need to answer these questions is everywhere to be found in legal pieces commanding the survey of maps since the end of the eighteenth century, and was remarkably vocal by the turn of the mid-century, during the «Regeneration».

It is a precision network because signals are located and painstakingly built with a high degree of accuracy, using sophisticated instruments. Like any other system of coordinates, a network allows one to travel across it. Displacement inside a geodetic network is a matter of mathematical calculus and spherical trigonometry. One can travel both transversally (between same level signals or geodetic orders) and vertically (across different levels). Nothing physically connects signals to one another; they are linked by calculations alone. The measuring (correct location) of signals in the terrain and the calculations used to connect them are called «triangulation». By knowing the values of certain ground points (their coordinates), triangulation enables one to calculate the value of any other point. Mathematical calculations keep the network integrated; outside mathematics there is no network – only strange-looking pyramids scattered through the landscape.

Military engineers built signals with the help of privates from the Engineering Corps. First, engineers reconnoitred the terrain on the lookout for signal locations. Second, in every «promising» location, the engineer would set a «tacheometric station»,

that is, a locale wherefrom he would conduct all measuring. The station (which can be portrayed as an ensemble of men and instruments, or «actants») «produces» readings, figures, which I will call, after Latour, «inscriptions». The station transforms «the world out there» into immutable mobile «inscriptions». In any map, the values of x , y , z , latitude and longitude are some of those *mobile, stable and interchangeable* inscriptions.

One can think of a geodetic network as a list of the names of the places where the signals were built, followed by their *addresses*, i.e., their coordinates. The points thus listed form large triangles that can be «filled up» with smaller triangles, called secondary triangles, which are also described by their names and addresses. Lesser-order triangulations are graphically represented at increasingly higher scales. The scale of the first-order triangulation was 1/500 000; the second order was surveyed at 1/100 000 (the final scale of the Chorographic Map); the topographic survey was done at 1/10 000 or higher scale. Due to the technical nature of scale, one can go from a higher scale to a smaller one, but not the other way around. Thus, it is necessary to unfold the first-order network into secondary networks, with an ever-increasing number of points. The precision of secondary networks is increasingly lower (if any measure implies an error, the multiplication of measures in the various orders exponentially expands the amount of error). At the level of secondary orders, to have precision means to keep the amount of accumulated error within specified limits. Precision does not spring so much from the eradication of error (which is impossible), but from its socialization, by accepting international standards of accuracy. Errors must be kept within certain limits.

Once first-order triangulations are concluded, one can start constructing second-order signals, going over the technical processes of reconnaissance, localization and calibration. One calculates ever more points, draws ever more and smaller triangles,

builds ever more signals, and covers in detail more and more terrain. At this point, one has not yet depicted the terrain, the landscape; one does yet not have a map. One has a very extensive list of names and coordinates supporting one another, holding one another together so to speak, established in a sequential procedure. The leap is from circa 130 points to circa 9 000 (see table next page).

There is a macroscopic difference between a network, however thick, and a map, which seems to be continuous. The distinction is readily apparent if one compares them. The map of a network displays lines connecting dots, it is filled with blank spaces, «holes» or «silences»; the topographic map «speaks» continuously, eliminates every interruption, fills in every blank. Without venturing into any sort of map epistemology, let me at least try and answer the question of how one goes from a set of juxtaposed networks (lines and dots) to a continuous representation of the terrain.

Construction and repair of geodetic signs

1848-1888

Fieldwork Campaigns	First-order signs built	Repairs in first-order signs	Secondary-order signs built	Repairs
Till 1848-49	29			
In 1849-50	10	7	66	31
In 1850-51	7		40	30
2 ^o s.51-1852	13	1	46	14
In 1853-54	7	3	128	45
In 1854-55	8	4	130	17
In 1855-56	4	2	167	42
In 1856-57	4	2	142	17
In 1857-58	4	1	264	46
In 1858-59	8	1	402	59
In 1859-60	5	2	391	77
In 1860-61	6		325	74
In 1861-62	6		326	20
In 1862-63	8	1	413	86
In 1863-64	4		310	42
In 1864-65	4		497	98
In 1865-66	1	1	346	40
In 1866-67		2	428	48
In 1867-68	2	1	108	43
In 1868-69			266	22
In 1870			195	30
In 1871			260	25
In 1872			111	44
In 1873				
In 1874	1	1	206	
In 1875		1	260	60
1 ^o s.76-1877		1	186	49
In 1877-78			139	26
In 1878-79		1	295	101
In 1879-80		2	47	7
In 1880-81		3	208	2
In 1881-82		2	262	13
In 1882-83		1	347	18
In 1883-84			150	8
In 1884-85			134	
In 1886		2	130	
In 1887			104	6
In 1888			2	
Totals	131	42	7831	1240

Source: *Relatórios anuais da Direcção dos Trabalhos Geodésicos*, 1849-1888.

Notes: the construction of the first-order network was concluded in 1865/66; the construction of the secondary-order networks was concluded in 1888.

The last representational stage is called topography or topographic survey. Topography does not really produce continuity in representation, but rather the illusion of it. This illusion results from a change in the way the information is graphically presented on the sheet of paper (and not so much from a qualitative difference in the kind of information which is being represented). How is this accomplished? For example, contour lines are used to continuously depict the altimetry of the terrain. A contour line is an imaginary line connecting ground points with the same altitude. The kind of information produced by the topographer is not different from that produced by the geodesist, only the representation protocols change. Contour lines, together with the use of colour and shading, generate the illusion of continuity. The tiny space between contiguous contour lines is just as much of a blank as the huge space between dots in a triangulation. In that space, there is «nothing» although there seems to be «something». Topography makes use of conventionalised signs to represent things: blue stands for water, square stands for military fortification, triangle for geodetic sign, cross for church, and so on. It is not as if a circle were a symbol of a city, but the contour line the faithful depiction of altitude. Both are conventional signs inside the semiotic system of representation we call a map. Both are a different real: they are displaceable, they are convertible, and they are mobile. They are a *tamed real*.

Fieldwork

Campaigns and daily time

Fieldwork was organized in field campaigns, which alternated with periods of office work, in Lisbon. This neat division corresponds to distinct yet complementary, modular moments of cartographic survey: as a module, fieldwork deals with reconnaissance,

construction of signals, field survey and auxiliary calculus; office work entails complex calculus, articulation of different field surveys, engraving and printing.

Fieldwork campaigns, one or two per year, were periods of displacement to the terrain over which a certain cartographic «task» had to be executed. Such tasks were decided beforehand by Folque and section directors and assigned to engineers in Lisbon. Because fieldwork is so sensitive to weather conditions, the months from May to September were the privileged period for field outings. As a rule, an officer would stay in fieldwork until he concluded the task he was given. In 1856, for instance, engineer Garção was charged with carrying out triangulation # 12, in the environs of the city of Santarém. Prior to going to the field, officers had to pass by the Depot, where, besides previous cartographic works including map-sheets, drawings, reconnaissance and route surveys, the necessary fieldwork instruments were stored: theodolite, thermometer, barometer, compass, and so on.⁵⁰ He would then set off carrying a safe-conduct that, in principle, warranted him unrestricted access across national territory. He would head for a previously chosen location, setting up his «quarters» there.

In the terrain, the day, or the light hours, was devoted to effective work in the field. The officer occupied himself with reconnaissance of ground points, setting up measuring stations, taking bearings, readings of altitude, longitude and latitude, constructing and repairing pyramids, and travelling back and forth from the quarters to the terrain. Nightly hours, or those times when the weather did not permit field outings, were used to review daily work, make calculations, elaborate catalogues of triangles, and keep mail exchanges with Lisbon, local authorities or fellow colleagues in the field, with whom the engineer may need to compare drawings, borrow instruments or conduct businesses related to finding supplies, contracting manpower or securing mounts. It was not infrequent that an officer would conclude a task before the end of the campaign, in

which case he would be appointed another one or else return to Lisbon to carry out office work.

Travail d'écriture

A continuous *travail d'écriture* connected the terrain with the Depot in Lisbon. This is a point whose empirical pertinence hardly requires illustration. The *travail d'écriture* is much more the context than the phenomenon within the context. Officers constantly corresponded with headquarters in Lisbon (addressing Folque and section heads), with each other, and with local or district authorities (civilian, military or clerical). This permanent work of writing unleashed an ever-increasing flow of information interweaving peripheries and centre into a network. As one might suspect, to keep the flow going was a tricky logistical feat considering the flaws in the postal service and the overall difficulties in transportation and locomotion.⁵¹

In their exchanges, officers mostly focused on the twin worlds of science and administration. On the one hand, «science», that is: figures, diagrams, catalogues, altitudes, bearings, and so on; on the other, «administration», that is: stipend receipts, construction budgets, fieldwork daybooks, notes on the daily pay of handymen, reports and so forth.⁵² The parity of these topics in the sources, their equally proportioned presence in mail exchanges warns one that to exclude «administrative work» from the ideal meaning of doing science is completely unwarranted. Likewise, against the symmetric exclusion of «scientific work» from what should be meant by state making.

The keeping of field daybooks was ever present in the officers' minds. These standardized journals allowed Folque to keep track of officers' productivity and daily routine. Often, Folque demanded clarifications from officers in regards to their low productivity, as portrayed in logbooks. For instance, Folque accused officer Pery of low

productivity. Their exchanges allow us to observe the bureaucratic technology in action. Simply put: daybooks boosted the centre's panoptic capacity to minutely oversee officers' daily work. At the same time, they translated a myriad social practices into a few figures, easily comparable, easily displaced onto another document, easily shown if needed be. Comparing the work done the previous year (up to 10 square leagues in 6 days) with July 1860 (28 square leagues of planimetry and 15 of configuration in 11 days), Pery remarked that more area would have been surveyed had he not started in such a low terrain. Also, the terrible weather had consumed many hours of marching to and fro. In the days he did not have to march, he worked the field 8 to 9 hours, even if the *average* for the entire 11 days is 4.5 hours.⁵³

Health and weather conditions

Officers' good health constituted an important risk factor. Oftentimes, officers took ill or had accidents while in fieldwork campaigns. August 1856, officer Garção informed Folque of an edict by the district's prefect determining that from 10 a.m. to 4 p.m. «all fieldwork [must] be halted, while the current canicular days are not over and the sanitary situation does not improve». Garção asked Folque whether he should follow the edict, «ordering bricklayers to stop working».⁵⁴ The sultry summer and an unfortunate fall from the horse exacted a dire tribute. Garção got sick. August 25, he addressed Folque again: convalescence «is going very slowly – the fever is still with me and the lesions are not yet healed [...] the surgeon told me to change location and therefore here I am again in Vendas Novas» He asked for convalescence in Lisbon – «otherwise, I will not recover».⁵⁵ This is but an example of a more general pattern.⁵⁶ Insalubrities, excessive heat, agues, falls from the mount, fires, downpours and floods, strong colds and gastritis – Garção underwent all of these.⁵⁷

Officer Braga changed the starting point of his campaign due to a lethal epidemic of typhus.⁵⁸ On medical advice, Silva Valente had to stop working because of a dilated vein he got from jumping over a ditch.⁵⁹ Eduardo Azevedo, a geodesist, wrote June 16, 1860: «Having been struck by an haemorrhage, and bleeding from my mouth, I had to go to bed [...] where I need to stay for a few days because it has not stopped yet, and this is the motive why I have not been able to conclude the task I was given». A month later, he had recovered, but in December he let Folque know that he could not go to work in the Depot.⁶⁰ In April 1861, Azevedo was still stuck in Lisbon with gastritis. His fieldwork campaign began mid-June, in Alentejo. A couple of months later, he was sick again with fever «in result of the scorching heat I have been suffering in the moor lands. I was compelled to retire to bed and call a physician: the physicians in this village are of the opinion that – going to work in the moors in this month is equivalent to seeking out death».⁶¹ Later in December, he had to stop when he was out inspecting pyramids: «I began by the Oliveira pyramid [...] my bad health did not allow me to continue, nor does it allow me to go and inspect others, as I am still with agues, bilious vomits, lack of appetite, and intense headache».⁶² He found himself sick, with no physician or pharmacy nearby, and decided to retire to Lisbon. Mid-December in Lisbon, he informed Folque that his health prevented him from going to work in the Depot.⁶³

Health problems were of course associated with harsh weather conditions. In addition, weather was crucial to aspects having to do with the means of locomotion, finding willing manpower, the resistance of pyramids, and other technical aspects. When Carlos Pego wrote: «it has not been possible for me to go to the field because a very cloudy weather does not allow one to see more than half a league afar», he was uttering one of the most common remarks one can find in the sources.⁶⁴ At the beginning of September, Leite Velho could not «keep up with the observations because

the horizons are closed or covered, so much that one can only see, at the distance of a ray of light, approximately, two leagues; this is [...] the result of the combination of fires with the great heat which has occurred this year».⁶⁵

Marcos Costa reported, in January: «it was hard to take profit from even a good enough day's work because the moors are so flooded that the private had to cross them 4 or 5 times with water at his knees going warm from walking, which resulted in him getting a cold and having already a shivering fit; on the 23rd I almost sunk the instrument and the mount in a mire. It is very hard to find bricklayers and help in this weather because they do not want to get wet when going warm from walking».⁶⁶ Undoubtedly, January was a difficult month to be an engineer in the field: «There were days it snowed heavily, even in the village, followed by many days of rain, which together with the melted snow brought big floods everywhere [...] [in the previous couple of days the weather had improved] dry days, but the atmosphere is quite hazy, due, I think, to the evaporation of waters, which does not permit to see afar».⁶⁷ In July 1862, Luna was stuck in Abrantes, a town upstream the Tejo. Writing back to Lisbon, he explained he had not finished his duties due to «continuous thunderstorms» all May. He was confident he would conclude his observations within the month, in spite of the need to repeat observations because his theodolite was «very imperfect».⁶⁸

Terrain, circulation and transportation

Getting around the countryside in nineteenth century Portugal was a complicated affair. Once outside the skeletal network of main roads, the traveller or the engineer would be left to dreadful secondary thoroughfares and animal trails. Moreover, hilly terrain, notably North of the Tejo, and scarce transportation infrastructures (either road, railroad or fluvial) combined to make circulation that much more difficult to tackle.⁶⁹

For engineers in fieldwork, the transport of cumbersome and delicate equipment and supplies across mountain ridges and flooded moors faced nearly unsurpassable obstacles. Geodesist Godinho reported: «The crest of this mountain is crowned by steep boulders of more than six metres height, making the access to the construction site and the entire ridge difficult because of a too steep a slope. So much so, it was necessary to unpack materials [...] and carry them in bare arms to the construction site. The stone is too rigid and of poor quality, and the water supply is far away and hard to transport».⁷⁰ The building of another pyramid in Alcaria do Cume led to the following outburst: «This is one of the hardest because it is located at the centre of the mountain ridge. Given the terrible goat trails, everything must come from afar, there is no village nearby; it is harvest time and thus it has been very difficult to assemble materials and workers. The stone comes from elsewhere, not very far away; the heavy stone used for corners is transported in arms, and some other in mules, because there are no carts, nor would it be possible to use them on account of the steep terrain».⁷¹

Moreover, if excessively hilly, the terrain posed specific technical difficulties. Godinho told Folque: «The terrain I am about to reconnoitre is so hilly and crammed with ridges that I expected, from what I have seen last year, to find great difficulties in securing a good connection of points, to say nothing of how bad it is to transit and the lack of all manner of conveniences».⁷² He was working on the first-order liaison between Alentejo and Algarve. Both provinces are separated by a string of mountain ridges running from east to west. Later in the year, Godinho complained: «At first sight, it would seem that by locating points in the ridges dividing Alentejo from Algarve it would be very easy to connect [them] with points near the shore; however, the terrain is too packed with crests that cloud one another. The time I have spent, and the work I have put in, would have sufficed to survey a whole northern province.»⁷³

Manpower, construction materials and supplies

Once in the field, one of the tasks to be accomplished right away was to find manpower in the localities at convenient prices. Bricklayers and handymen had to be hired, unless engineers were able to deploy privates from battalions stationed nearby, which was not always the case. This was difficult for a number of reasons. First, the construction of railroad lines was already absorbing the surplus workforce in the localities. Second, railroad prices were used to set the standard for a day's payment and this was usually more than the Department was ready to disburse. Third, men tended to dislike the job, claiming it was too demanding in comparison with working the harvests or public works. Finally, the availability of workers varied according to the arms needed to work the fields (in harvesting times it was difficult to hire people). Therefore, officers had a hard time securing manpower. Valente informs he had to pay at least the same as railroad companies did, but still «a couple of handymen resigned after a month». The next month, he had to employ five different men in six days «because after a day in the field, they were unhappy when they came back, saying this is a job in which one walks all day long without a rest and they could not accompany me anymore. However, I cannot give them rest because the days are numbered, the winter is ever closer, the work is hard and the task must be completed».⁷⁴ In Monforte, high Alentejo, in scorching mid-July, a private serving as bricklayer got sick and the officer had great difficulty in finding replacements in the locality and environs: «a manpower shortage in result of the great many arms employed by the railroad company and the Department of Public Works».⁷⁵ Bernardo Ribeiro complained that the railroads took anyone and the pay was good. The work had «permanence and fatigue [was] not much». To this he added: it was olive picking season: «how can one find men willing to drop a secure and well paid job

in exchange for a worse life, and to surely loose a day's work pay whenever the sky is slightly cloudy?»⁷⁶

Inspectorate and apprenticeship

As a complement to scholarly training in engineering schools and academies (whose syllabuses combined theoretical and applied components), officers' training included a demanding apprenticeship, which took place with the Department, with a duration usually equivalent to one fieldwork campaign (up to nine months). During the apprenticeship, a senior officer would assess the aptitude of the junior one. In 1858, the then sub-lieutenant Brito Limpo served his apprenticeship under the supervision of engineering lieutenant Salema Garção. On September 23, Garção reported: «the sub-lieutenant Brito Limpo presented himself to carry out his apprenticeship of reconnaissance and choice of trigonometric points for secondary triangulations [...] it is my duty to report to Your Excellency that said officer, for his intelligence and diligence and for the practical experience he already displayed of chorographic works, is in a state of being capable of working on his own».⁷⁷

The inspectorate stood out in the General Department's institutional design, confirming what seems to be a generalized trend in the development of administrative apparatuses (which, in turn, can be linked with the increasing importance of cycles of observation and assessment). Each section had its own inspective service, carried out by the section head. Caetano Batalha, head of the chorographic section, inspected a handful of junior officers in 1860. In this particular year, Batalha was very critical of young officers, and he wrote discouraging reports: «It is hard for me to report to Your Excellency that I completely disqualify him [officer Mourão] [...] [his works] are full of inadmissible errors and important and unforgivable flaws».⁷⁸ A propos of another

inspection, he wrote more generally: «From the evidence of such important flaws, I realize that some of the officers employed in these works, having concluded the levelling, do most of the terrain's configuration at home; by doing so, even if they make use of great skill, it is impossible not to alter substantially the shape of the terrain».⁷⁹

Demolition of «pyramids»

As early as 1849, Folque complained to Interior about the demolition of pyramids and the local authorities' lack of vigour in watching over them. Such destruction encumbered the orderly progress of works since it caused delays and redoubled costs, which could bring the enterprise to a halt.⁸⁰ In the summer of 1849, several official letters warned the minister, resulting in an ordinance whereby prefects, municipal administrators and civil parishes were charged with guarding the pyramids, employing all means necessary. In the event of such a misdeed, those officials were to apply all judiciary procedures necessary «to file a lawsuit and the culprit be punished».⁸¹ Folque also suggested pyramids should be watched over, not just by police corporals, but also by rural proprietors and cattle-owners because «demolitions are often caused by shepherds; and when they are not, they usually know who perpetrated them».⁸²

As the years passed, Folque grew worried. Either legal action was impracticable or it was a case of «sloppiness», «lack of zeal» and «ignorance» of local authorities. Regarding the perpetrators, officers assured destructions were done by «boys and even drunk men, out of evilness or brutal distraction, by young shepherds, and herdsmen, to whom people call '*ganadeiros*' [cattle-breeders]; by the total lack of care and perhaps wickedness of those who plough the land [...]; by utterly stupid people, filled with extravagant ideas in regards to the use of these [geodetic] signs that other people have purposively made them to believe». If, from the financial point of view, destructions

resulted in additional expenses, from a practical point of view they «paralyse the course of works, being therefore the cause of further delays and larger expenditure, or they completely annul whatever has been done, checked and even engraved and printed». So serious was the situation, Folque did not hesitate: «and if there is no way to put an end to such scandal and vandalism [...] I solemnly declare to Your Excellency that Geodetic and Topographic Works are absolutely impossible in this kingdom.»⁸³

In the early 1860's destructions continued (see table above). A couple of illustrations will suffice: at the outskirts of Santarém, an officer found the debris of a small pyramid. Word around was that «it had been demolished for the enjoyment of boys, or even as a pastime of whoever usually passes by». The officer was scandalized by the occurrence, after so many warnings to local authorities, in a place «where superior and subaltern civilian authorities do exist».⁸⁴ In 1862, an officer reported a pyramid had been destroyed. «As soon as I got word of this fact I went there to look at the debris [...] I concluded it was [done] on purpose and planned beforehand, because the construction was very solid [...] It could not have been a boy's thing, because it is not in the strength of boys [...]; moreover, if the pyramid were to fall on its own, the debris would fall to the side; instead, debris is placed around the pyramid's body and in such a way one can understand it was taken off layer by layer. One can still tell which rock stood on top of which».⁸⁵ Purposeful deeds weren't all that resulted in the destruction of pyramids. Bad weather conditions and construction errors were also of importance.⁸⁶ The crescendo of concern culminated in the 1870-annual report, wherein all arguments were emphatically reiterated. Therein, Folque holds local authorities directly accountable for «unforgivable neglect» and «criminal indifference» towards «facts of true barbarity, which, if perhaps they do not witness, no one believes they can possibly ignore».⁸⁷ Let us not forget reports were publicized in the official gazette and

this consideration was not absent from Folque's mind while assembling materials to write them.

From the examples I have collected a strong notion emerges, to wit: destructions perpetrated by herdsman or peasants seem often to be ordered by local notables, proprietors or cattle-breeders. The issue of purposeful demolitions puts the capacity to maintain an administrative order to the test. The vigilance of signals, the abidance by ordinances and decrees, the necessary judicial procedure in the case of breaches of the law, the interaction between central rule-making authorities and local police and judiciary authorities and finally the interplay between different ministries (Interior, Public Works and Justice) – all of these bring into the fore the core issues of statecraft. Local authorities were unable or unwilling to watch over pyramids. The judiciary administration was incapable of arresting, judging and sentencing any of the authors, not abiding, in practice, by consecutive ordinances and decree-laws. This idea of the difficult imperviousness of territorial policies to local or corporate influences is stressed by yet another testimony:

«It is my duty to inform your Excellency that May 1 it was ordered the construction of a pyramid in the hill known by the name [...] May 2, [...] the pyramid was completely demolished [...] Today, the ordinary judge and his clerk set off, the under-delegate of the public ministry, two bricklayers and a couple of witnesses in order to elaborate the required act of offence. The experts have stated under oath that the demolition was done on purpose [...] This whole process is going to be submitted shortly to the District Attorney [...] and for that reason I dare remind Your Excellency that it would be very convenient to address an official dispatch to the Ministry of Justice, or maybe to the Royal Prosecutor, so that the latter can activate the process and do everything in his power to find the author of such an outrage, and *prevent local influences from producing the customary effect.*»⁸⁸

Assaults and insults

Working in the field could be a dangerous affair. In the first half of the century, the irascibility of populations and the political restlessness of the country, kept alive for four decades⁸⁹, often clouded the «peace of mind required by the scientific spirit», as Folque euphemistically put it.

«Those who suffer the hardships and inconveniences of excursions through the arid moors and steep mountains of Portugal, or amongst fairly rude peoples, need not add the pernicious consequences of the continuous revolutions of this god-forsaken country, to render works absolutely impractical. In fact, engineering officers, charged with these works, though displaying the prudence and common sense needed to live in harmony with the peoples, amongst which they have to pass repeatedly, excessively suspicious people, seeing them in the ridges with lenses and instruments, often think these to be causes for omens of war or new taxes: if it is easy to dissuade them of this persuasion in tranquil times, on the contrary, it is impossible to do so in revolutionary crises; and experience has shown that in such epochs it is necessary to abandon works altogether because the distrust of everybody and everything becomes dangerous.»⁹⁰

The most exemplary case is officer Valente's. In the words of Folque (which followed closely the original letter): while Valente was «executing the works with which he [was] charged, some men of said hamlet approached him armed with wooden sticks; having addressed him threats and insults, displaying the will to tear apart his drawing paper, they told him to leave the premises, threatening him with his death should he come back. In order not to be maltreated and keep the work of seven months from being torn apart, [he] thought it wise to leave. In these contemptible actions, he said, a man exceeded all others: the biggest tiller of the village».⁹¹ Valente's official letter states: «Because I did not provoke them in any way and eventually went away, they left me to myself, though still threatening me with death were I ever to return there. I could not

help but go back to the hamlet the next day to continue my work, but this time accompanied by the parish commissar, to whom they were respectful».⁹²

In 1862, a propos of yet another assault, Folque reiterated his criticism of local authorities' lack of vigour. If they kept on doing nothing, he forecasted «deplorable facts, which will forcefully occur, because officers will be compelled to carry firearms for their own defence, and then it is not very likely they will let insults go by unpunished.» He calls for action in order to avoid further excesses by «rude, ignorant and ill-advised people».⁹³ A propos another such case, the director was clear: «these deplorable acts can only be suggested by the wickedness and perversity of those who practice them, or perhaps under the advice of ill-intentioned individuals, who, abusing the simple-mindedness of peasants, lead them to practice all sorts of evil deeds, often to pursue their own political goals.»⁹⁴

Such confrontational episodes were also interesting from an identitarian perspective. One should recall that these men were simultaneously engineers and military. Each of these affiliations translated into codes of conduct and expectations, for instance, the importance of honour and gentlemanly behaviour. As it is not clear from the sources how such episodes were experienced, one can only speculate. The military engineer might not have felt threatened by «the brutes», the populace; perhaps he felt somehow superior. This feeling would have been reinforced by his professional honour as an engineer, leading him to preserve his work – his mission – above all else, and above personal honour. Nevertheless, this was a sensitive issue, as Folque's reference to the need of carrying firearms suggests. Firearms would doubtless have a deterrent effect, but they would also be read as an admission that the military engineer was walking «hostile» territory. In the mind of the centralising and modernising bureaucrat,

to admit to that was tantamount to admitting to a breach in the integrity of the state's «empire of law» and territoriality.

Identity

The hardships officers had to endure were a particularly relevant issue in structuring their *personae*. Such hardships were not merely symbolic, but also material and physical, as we have just seen. Moreover, they were kindled by low and intermittent wages. Folque expressed his concern thus:

«The legal wages earned by engineering officers are known to all; no one ignores the huge disbursements one is obliged to in Portuguese roads and inns; geodetic works depend on continuous excursions, most times across hills and moors, out of roads and villages: as thrifty as an officer might be, experience has shown that this special service cannot be performed without suffering dire hardships and perhaps a certain break of dignity in the social position itself».⁹⁵

To fully appreciate the formation of an engineer's identity it is important to sketch his social inscription in coetaneous society. In this regard, one should pay attention to the dynamic relation between an expanding employer-state and a society opening up to the upward social mobility of professional «middle classes». It is my hypothesis that, for the officers, aspects dealing with the acquisition and maintenance of social status – «social position» in Folque's expression – were very significant due to a situation of relative deprivation. The expansion and specialization of the administrative apparatus in the second half of the nineteenth century, particularly of departments related to public works, communication infrastructures and cartographic and statistic information, in parallel with the slow institutionalisation of the scientific field's structures, increased the opportunities for professional progression for officers holding a skill in engineering, in general, and in «mathematical geography» in particular, within the military and the

civilian administration. To the expansion of the sphere of application of engineering professional skills, engineers responded by performing several strategies directed towards competing for the appropriation of those expanding opportunities and of the different capitals and resources associated to them.⁹⁶ Amongst these strategies, and in the field of engineering, I single out the professionalisation and credentialisation of practitioners, best exemplified in the setting up of the Association of Portuguese Civil Engineers, in 1869.⁹⁷

In the course of the second half of the nineteenth century, officers in the «scientific corps» travelled a path of burgeoning power and social status towards a sort of «scientific aristocracy».⁹⁸ This aspect did not escape the attention of a contemporary observer (an ageing general): «Nowadays we are over the prejudice [the fact that nobility, in the eighteenth century, had officers of scientific corps «in a consideration a little above de condition of mechanical officers»] [...] in the engineering corps one can find distinguished gentlemen, seeking to marry the aristocracy of birth with that more real and valuable one, the aristocracy which springs from science and its practical applications in the great and bloody art of war».⁹⁹ The societal mechanisms which offered the possibility of ascendant social trajectories (even if targeting the attainment of prestige symbols identifiable with the nobility) subverted step by step the criteria upon which the former stratification scheme was built.¹⁰⁰ In fact, Almeida convincingly shows that a clear displacement in the social centre of gravity of power took place, with the middle classes obtaining a hegemonic position in the major functional hierarchies within the «power elite».¹⁰¹ In Liberal Portugal, the arduous and intermittent institutionalisation of geographic engineering translated, by comparison with «other» engineering branches, into lower and more haphazard wages. This fact made it difficult

for geographic engineers to develop social trajectories as successful as those of civil engineers or even of the emerging «liberal professions».

Conclusion

The set of decisions taken in 1852 was rife with consequences, some of which were premeditated, some not. Said policy had *structuration effects*¹⁰² in the half-century to follow, and not just in the next twenty-odd years. This means that some options were enabled, activated, while others were shut off, constrained. The best way to describe this is to look at the ensuing programme development as path-dependent.¹⁰³ Politically, as I have shown in Chapter I, the designing of the chorographic programme, first sketched in 1851, came as a response to the failure of the former programme, the Topographic Map coupled with the cadastre. After 1852, in the «Regeneration» context, the ideas laid out by Folque in 1851 found a fitting political agenda and a willing Parliament.

The priority assigned in 1852 to the *Carta Chorographica* at the scale of 1/100 000 set the limits and creative possibilities of the model embodied by the *Carta* itself. «Up» scale, towards larger scales, the Chorographic Map was utterly obsolete. Therefore, in the event of wanting to form a topographic map or the parcelled cadastre, the whole terrain would have to be re-surveyed. Furthermore, as far as geodetic networks were concerned, the compromise solutions made both in the Chorographic and Geographic maps (see below) would not endure the level of rigour required by those works: it would then be necessary to observe and check *the whole* geodetic network, from the first to the *nth*-order. Because the survey of the chorographic map took the better part of the second half of the century; because the chorographic project that followed was the map's revision and publication at the scale 1/50 000 as the New Chorographic Map (*Nova Carta Chorographica*); and because the decision to survey

the cadastre was never taken, topographic survey was conducted only in a casuistic and experimental manner.

The most important large-scale map actually surveyed in over five decades was the *Carta Topographica de Lisboa* (Topographic Plan of Lisbon) in the scale of 1/1 000. The government commanded the survey of Lisbon's plan in order to support a clearly «civilian» endeavour of urban infrastructure modernisation: thoroughfares, sewer system, water supplies, and son on.¹⁰⁴ The chart's decisive feature was obviously its enormous scale, which qualified it as a cadastral plan. The Plan was surveyed by private contract between 1856 and 1859, making for a 65-sheet atlas. Considering the cumbersomeness of using a 65-sheet atlas, work for reducing the chart to 1/5 000 began in 1859. The chart was ultimately printed at that scale, in 1878, in a couple of sheets. For the future, Folque thought the Plan should be used as the cadastral plan of Lisbon, with clear fiscal purposes, taking full advantage of the huge scale.¹⁰⁵ However, the government never took this step. It is interesting to draw a parallel with the Spanish case. Until it was abandoned in 1870, Spanish parcelled cadastre was tried in the Madrid province. The *Junta General de Estadística* put a special emphasis on the survey of the urban cadastre of the city of Madrid, begun in 1860 and published in 1866-68. Although in Spain the survey followed from its inception an orientation towards the cadastre and the Topographic Chart of Lisbon did not, it was Folque himself who suggest that possibility, which was never put to practice. As Muro *et al.* suggest, there were plenty of reasons for frustration because the survey never had any fiscal clout, so much so that in Madrid province proper, the Ministry of Finance kept on using the old *amillaramiento* system to apportion the property tax.¹⁰⁶

«Down» scale, towards smaller scales or «geographic» scales, it meant that, in practice, there were two possibilities for the government to have a general map at a

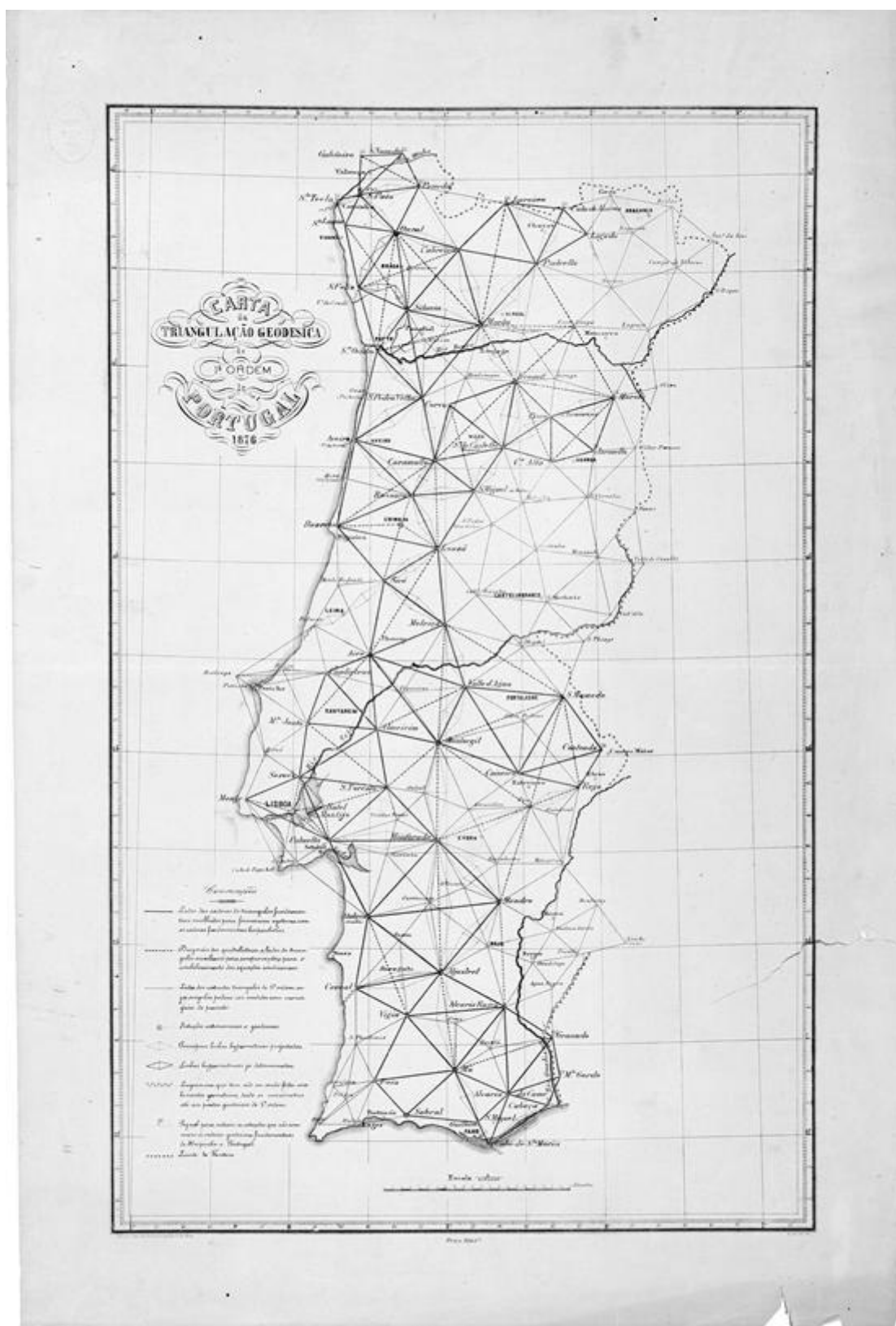
geographic scale (1/250 000 or smaller): await the conclusion of the Chorographic Map's sheets and, from them, through a process of reduction from the bigger to the smaller, form a geographic map. This hypothesis, which was actually put into practice, implied that the geographic map would be available only when the chorographic map was concluded; or, considering the slowness of the latter and the urgent need of a modern map at a geographic scale, would form such a map *at the same time* as the chorographic, though adopting lighter observation protocols. This hypothesis was also carried out in the *Carta Geographica* (Geographic Map).

The most important small-scale map surveyed within the 1852-programme framework was the *Carta Geographica*, at the scale of 1/500 000. Even though the aim of the *Carta Chorographica* was to support advances in the networked expansion of communication infrastructures, the government was exasperated by the slowness of its survey. In reality, by mid 1860's, there was still no chart providing an integrated and «workable» version of the whole territory. The government commanded the survey of the Geographic Map to redress that shortcoming. This chart sought in particular to satisfy the geological reconnaissance of the realm.¹⁰⁷ Additionally, it was important to help redraw electoral constituencies.¹⁰⁸ The chart was supported by the first-order network (concluded «in a hurry» for that purpose), and used the surveys already done for the *Carta Chorographica* (ca. 1/5); all the rest was «quick reconnaissance». This is the secret behind its rapid survey: between 1859-60 and 1864-65. The chart was first published in 1865, and then in 1866 with the provisional draft of the geological survey to be presented at the Paris Universal Exhibition, in 1867. At last, in 1876, the chart was published with the definitive geological survey by Carlos Ribeiro and Nery Delgado. Notwithstanding the harsh criticism it was subjected to¹⁰⁹, the publishing of the *Carta Geographica* was a breakthrough and a major cartographic event. Alegria and Garcia

consider it to be «the first modern general map of the country, constructed with solid scientific bases. It is from it on, and having it as backdrop, that countless thematic maps will be done on transports and communications, vegetable coverage, peopling, regional borders».¹¹⁰ In fact, this chart came to be of crucial importance for presenting to a nationwide audience (it was reproduced in school text manuals, for instance), for the first time, the figure of Portuguese territory, putting, at long last, an end to the backward persistence of a limited diffusion of modern maps.¹¹¹

The compromises made in order to survey both Chorographic and Geographic maps impacted dearly on geodetic networks. The first-order geodetic network was concluded «in a hurry» in 1865 so that it could be used as a prop for the Geographic Map (see Map n. 3). «In a hurry» means that observations used a old-fashioned technology, abbreviated calculation protocols and nearly obsolete instruments. The downgrading of the quality of the first-order network made it unfit for any high geodesy procedures. This problem was aggravated by three interconnected factors: the linkage with the Spanish fundamental geodetic network, surveyed with higher rigour standards, brought problems of compatibility and homogenisation; from 1867 onwards, the Portuguese and Spanish participation in the International Geodetic Association set precision standards that the Portuguese 1865-first-order network could not comply with; the necessary precision levelling of the network, even if feasible in the future, would not fit well with the extant network. The answer to this set of issues was the *Rede Geodésica Fundamental* (Fundamental Geodetic Network), basically a part of the first-order network, re-observed with state-of-the-art instruments, following a better observation method. This network was concluded in 1888 (see Map n.4).

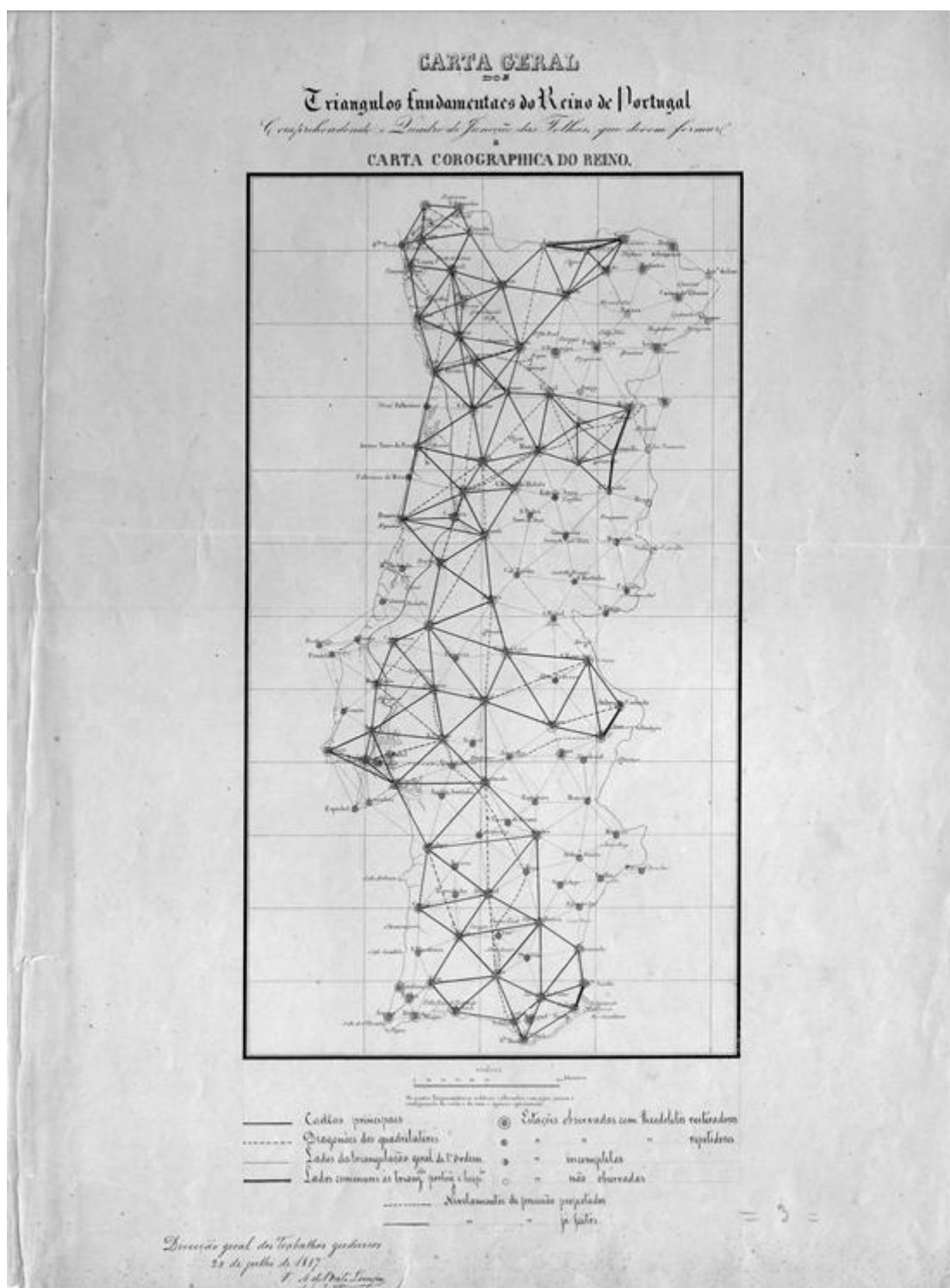
Map n. 3



Carta da Triangulação Geodésica de 1ª Ordem de Portugal, 1876

Source: IGP Archive.

Map n. 4



Carta Geral dos Triangulos Fundamentaes do Reino de Portugal comprehendendo o Quadro de Juncção das Folhas que devem formar a Carta Chorographica do Reino (drawn by Francisco António de Brito Limpo, 20-7-1887)

Source: IGP Archive

Looked at from an institutional perspective, the development of the chorographic programme was full of consequences, especially concerning institution-building. As a map-surveying institution, the old Board could not endure the demands posed by the execution of any cartographic policy, whether topography-cadaastre or chorography. In fact, by the end of the 1840's, the Board was little more than a small surveying machine to which the completion of the first-order network was already a daunting achievement, never mind a topographic map. Personnel had to be given a stable frame of work and the prospect of a career; monies had to be secured to pay men on a regular basis, to buy instruments, and generally to enable a flicker of continuity in fieldwork. The transformation of the Board into General Department, in 1856, made these changes easier. The transformation of the latter into Geographic Institute in 1864 reaffirms the change, and constitutes a sound sign of institutional consolidation. The sections on personnel and financing confirm this interpretation.

From a managerial perspective, and to provide just one example, the best way to pay officers and assess their productivity was decided only after fairly prolonged experience in actually surveying the *Carta Chorographica*. As with weights and measures and the census (we shall see), to translate a policy into an institution, and then put the institution to work in the field was a trial and error process, it was neither settled once and for all, nor beforehand. Many elements had to be hold together at once: it was useless to be able to secure officers and prevent them from going back to their military careers once the commission in the Board was over (as the General Staff repeatedly asked) and then fail to have instruments for them to work with; it would be pointless to have officers working in the field and then have the signals they had built systematically destroyed and the work of months lost; and so on. Therefore, whether in terms of administrative and map-making technology, one observes a similar institutionalisation

pattern: reciprocal adjustments between «programme» and «practice», supported, or fed by, cycles of information-gathering, assessment and reform. This is the reason why concepts such as «technology of government»¹¹² and «governmentality»¹¹³ are useful for the understanding of Portuguese historical state modernization.

Much the same could be said about fieldwork – and indeed that is my point. I tried to carry out an exercise in symmetry. In the domain of science, the symmetrical counterpart of the «political programme» is the «scientific programme». The «scientific programme» frames practice no less than, say, the ministerial ordinances or monies. On the one hand, there is «politics», the political programme, with its apparently circumscribed actors and heterogeneous elements; on the other, there is «science», the scientific programme, with its apparently circumscribed actors and heterogeneous elements. In both cases the same goal and the same sociology: to know and to control things and peoples at a distance, make things do things, distil government – through technology. The resistances faced all along are the resistances technology faces: «forces» (people, weather, politics, faulty instruments) which «work» to tear the network apart, to dissolve its connections and scatter its elements. To this extent, fieldwork can be re-described as a patchwork of elements laboriously stitched together in order to execute a certain «programme»: to survey a map. However, both planes are deeply connected: difficulties faced in fieldwork translate into difficulties in programme development, which translate in political difficulties, which in turn can translate into fewer monies, less personnel, fewer instruments, which then constrain development possibilities, and so on.

Let me provide a couple of examples. At the level of the elaboration of cartographic policies, the existence of a relevant fiscal and political impact, or lack thereof, was critical. The «Regeneration» programme (cartography as a tool of

development) never really faced significant political pressure in Parliament. It worried no one, was relatively inexpensive, was in everybody's interest and had no fiscal clout whatsoever. Were it to cost much more and be useful in taxing property more efficiently and equitably, like the cadastre, as it were, like the former, pre-1852-programme, and thus to have painful fiscal bite, and it would have faced – as indeed it did – fierce resistance. In fact, despite being trumpeted as the «best doctrine», scientific and politically wise, the cadastre was never to be surveyed and there was never a nationwide large-scale map of Portugal.

At the level of fieldwork practice, in the face of resistance, just as with weights and measures and the census, it was very important to secure the cooperation of local actors, as the sections on assaults, insults and the destruction of pyramids made clear. Just as in the case of weights and measures and the census, enforcement mobilized a string of actors at the local and central levels. Usually, inspectors were the ones doing most of the mobilizing. As well as told to, people had to be convinced, persuaded. Again, inspectors did just that.

Notes

¹ José Maria Salema Garção to Filipe Folque, ms., 7-8-1857, *Correspondência de serviço dos oficiais*, box I.G.C. 1284 «Correspondência, Diversos. 1855 a 1876», AHIGP.

² Rui Branco, *O Mapa de Portugal. Estado, território e poder no Portugal de oitocentos*, Lisbon, Livros Horizonte, 2003, pp. 23-26

³ Filipe Folque, «Trabalhos Geodesicos do Reino. Relatório», *Revista Universal Lisbonense*, 1st series, t. VII, ns. 26 and 27, 1848, pp. 301-306 and 314-316.

⁴ Branco, *O Mapa...*, op. cit, 2003, p. 153.

⁵ Joaquim Pedro Oliveira Martins, *Portugal Contemporâneo*, Lisbon, Guimarães Editores, 10th ed. (1st ed. 1881), 1996, II vol., p. 121

⁶ Maria de Fátima Bonifácio, *Apologia da História Política*, Lisbon, Quetzal, pp. 160-181; Maria de Fátima Bonifácio, «A guerra de todos contra todos», *Análise Social*, n. 115, 1992, pp. 91-134.

⁷ José Miguel Sardica, *A Regeneração sob o Signo do Consenso*, Lisbon, Imprensa de Ciências Sociais, 2001, p. 31. Vasco Pulido Valente, *Os Militares e a Política (1820-1856)*, Lisbon, INCM, 1997.

⁸ Valente, *Os militares...*, op. cit., 1997, pp. 23-58.

⁹ Sardica, *A Regeneração...*, op. cit., 2001, p. 32.

¹⁰ Manuel Villaverde Cabral, *O desenvolvimento do capitalismo em Portugal no século XIX*, Lisbon, A Regra do Jogo, 1976, p. 189. On the «fontismo», see Maria Eugénia Mata, «As três fases do fontismo: projectos e realizações» in AA.VV., *Estudos e ensaios em homenagem a Vitorino Magalhães Godinho*, Lisbon, Sá da Costa, 1988, pp. 413-431, here pp. 417 and 419-420; and Rui Ramos, «O sistema fontista» in António Reis, dir., *Portugal Contemporâneo*, Lisbon, Publicações Alfa, 1990, pp. 125-146.

¹¹ Conselho de Obras Públicas e Minas, «Relatório do Conselho de Obras Públicas, e Minas, que acompanhava o plano geral das comunicações do Reino, proposto pelo mesmo Conselho» [authored by Joaquim Tomás Lobo de Ávila], *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, n. 3, March, 1854, pp. 209-218, quote pp. 209-210. This was a difficulty felt by most European countries, e.g. Spain (José Ignacio Muro, Francesc Nadal and Luis Urteaga, *Geografía, estadística y catastro en España. 1856-1870*, Barcelona, Ediciones del Serbal, 1996, pp. 7-9), France (Gilles Palsky, «Les développements de la cartographie statistique au XIXe siècle» in AA.VV., *La Cartografia Francesa. 5è Curs du Cicle de conferències sobre Història de la Cartografia*, Barcelona, Institut Cartogràfic de Catalunya, pp. 149-164, here p. 150) and Italy (Emmanuela Casti Moreschi, «Cartografia e politica territoriale nella Repubblica de Venezia (secoli XIV-XVIII)» in AA.VV., *La Cartografia Italiana. 3er Curs du Cicle de conferències sobre Història de la Cartografia*, Barcelona, Institut Cartogràfic de Catalunya, pp. 81-104, here p. 90).

¹² Thomaz Rumball, «Relatório contendo um plano geral, secções, etc., apresentado à direcção da Companhia Central e Peninsular em Agosto de 1855», in Pedro Dinis, *Compilação de diversos documentos...*, Lisbon, 1915, pp. 19-43 cit. in Maria Fernanda Alegria, *A organização dos transportes em Portugal (1850-1910). As vias e o tráfego*, Lisbon, Centro de Estudos Geográficos, 1990, p. 247.

¹³ [Wattier] «Relatório do engenheiro francês Wattier sobre a construção dos caminhos-de-ferro em Portugal», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, n. 1, 1860, p. 82.

¹⁴ Decree 30-8-1852 and annexed report.

¹⁵ This point was made clear by Tavares de Almeida. He sees in the functional specialization of the administrative apparatus a sure sign bureaucratic modernization and expansion – but not only. In his analysis, the same process is at work in the differentiation of the internal structure of ministries into departments, boards and so on; in the diffusion of the general-department scheme; in the heightening of the hierarchical structure of the organizations; and in the standardization of norms and bureaucratic procedures, as well as the careers of civil servants. See Pedro Tavares de Almeida, *A Construção do Estado Liberal. Elite política e burocracia na «Regeneração» (1851-1890)*, Lisbon, FCSH, mimeo., 1995, here pp. 253-256.

¹⁶ Folque, «Relatório...», op. cit., 1848, pp. 315-316.

¹⁷ Filipe Folque to minister of the Interior, ms., 7-10-1851, doc. n. 55, DGOP 10 RT, AHMOP.

¹⁸ Public Works ministerial ordinances of October 27 and November 9, 1852

¹⁹ See Branco, *O Mapa...*, op. cit., 2003, p. 115 and Alegria, *A organização...* op. cit., 1990, pp. 44-60.

²⁰ Second-stage survey areas, like Alto Alentejo and Baixo Alentejo, were no less important as privileged ground for the «Eastern» line and the main royal road connecting to Madrid.

²¹ Filipe Folque, *Projecto de organização permanente da actual Direcção Geral dos Trabalhos Geodesicos, Chorographicos e Hydrographicos do Reino*, ms., 48 fls., 5-9-1864, AHIGP.

²² Filipe Folque to minister of Public Works, ms., 6-11-1852, *Registo dos officios remetidos...*, Liv. n. 2, 1852-1865, CGT do Reino, AHIGP.

²³ Public Works ordinance 9-11-1852, which reproduces *ipsis verbis* the 6-11-1852 official letter.

²⁴ Public Works ordinance of 9-12-1856. Filipe Folque to minister of Public Works, ms., 10-11-1856, *Registo dos officios remetidos...*, Liv. n. 2, 1852-1865, DGTGCHG do Reino, AHIGP.

²⁵ Geodesy, chorography and hydrography; a section head was appointed for each one, with inspection duties in fieldwork and office work. Ministerial ordinance 9-11-1856.

²⁶ For period information, see Maria de Fátima Bonifácio, «História de um nado-morto: o primeiro ministério histórico (1856-1859)», *Análise Social*, vol. XXXV (157), 2001, pp. 989-1012.

²⁷ Decree 3 October 1864. See Maria Paula Paula, *A construção de uma identidade profissional: a Associação dos Engenheiros Civis Portuguezes, 1869-1937*, mimeo., Ph. D. dissertation presented to UNL/FE, Lisbon, 1994 and Humberto Gabriel Mendes, «Subsídios para a história da cartografia e engenharia portuguesas no século XIX», *Revista do Instituto Geográfico e Cadastral*, n.1, December, 1981, pp. 25-74.

²⁸ Articles II and III of the decree of 28-12-1864.

²⁹ Filipe Folque, *Relatorio expondo o estado do serviço da Direcção Geral, indicando algumas alterações a fazer no mesmo serviço*, ms., 6-4-1868, 7fls., AHIGP.

³⁰ Cf. Muro, Nadal and Urteaga, *Geografia...*, op. cit., 1996, pp. 29-43.

³¹ Maria Helena Dias, «Os primórdios da moderna cartografia militar em Portugal: uma história por contar», *Revista da Faculdade de Letras de Lisboa*, 5th series, n. 24, 1998, pp. 45-80.

³² «[B]ecause in the practice of the respective sciences as in many other scientific works derived from them everything was disseminated and even doubled in the above mentioned departments [Geographic Institute, Military Archive and General Staff], whose reciprocal independence is very harmful to the scientific part of the service and the economy one should keep in so important branch of the public service», in «Relatório anexo ao Decreto sobre a organização do depósito de guerra», 23-12-1868, *Diário de Lisboa*, n. 295, 28-12-1868.

³³ Bill 30-10-1868. In fact, the bill 30-10-1868 had justified thus the decision: «It is uncontroversial that special arms are not easily improvised on the eve of a campaign. Therefore the need to keep, in peace times, a set of engineers proportioned to the demands of war. However, in a country where military engineering works are unavoidably limited by the exiguity of the Treasury, which is the school where engineering officers will learn the practical science of their profession? [...] In a nation like Portugal, where it is advised to use capacity with maximum economy, it is easily deemed useless and superfluous a special corporation of civil engineering, of which more emulation than need could serve as an excuse».

³⁴ Arts. 6 and 7 of the bill 23-12-1868.

³⁵ Arts. 1 and 2 of the bill 18-12-1869, *Diario do Governo*, n. 294, 27-12-1869, complete with «Organic regulations of the General Department of...», in *ibidem*.

³⁶ Report annex to bill 18-12-1869.

³⁷ Report annex to bill 18-12-1869 (my emphasis).

³⁸ Filipe Folque, *Memória sobre os Trabalhos Geodesicos Executados em Portugal Publicada por Ordem se Sua Majestade*, vol. 4, Lisbon, Tip. da Academia Real das Ciências, 1852, pp. 657-658.

³⁹ Folque, «Relatório...», op. cit., 1848, pp. 315-316.

⁴⁰ Folque, «Relatório...», op. cit., 1848.

⁴¹ Folque, *Memoria...*, op. cit., 1852, p. 658; José Silvestre Ribeiro, «Trabalhos Geodesicos», in *Historia dos estabelecimentos scientificos...*, t. XV, 1881, p. 50.

⁴² Bill 12-7-1849, *Diario do Governo*, n. 166, 17-7-1849.

⁴³ Since geodetic works were, from 1852 on, located in Public Works, it is important to have a global picture of the expenditure in Public Works. The very irregular evolution of the curve shows, in essence, that effective expenditure accrued in cycles and by thresholds. After a couple of initial decades of oscillation around 5 000 *contos*/year, expenditure in the Public Works increased rapidly from the middle of the 1870's. This means, for instance, that from the middle of the 1870's, for the weight of geodetic works to accrue, it would be necessary for its growth rate to outweigh that of Public Works. See *Ministério das Obras Públicas. 1852/1977*, Lisbon, MOP, 1977, p. 25.

⁴⁴ In 1850, for instance, Folque stated the service needed 40 privates, though only disposing of 30, of which 28 executed fieldwork. See Folque to the minister of the Interior, ms., 2-9-1850, *Registo dos officios remetidos...*, Liv. N. 1, 1833-1852, CGT do Reino, AHIGP.

⁴⁵ Filipe Folque, *Instruções Pelas Quais se Devem Regular o Director e Officiaes Encarregados dos Trabalhos Geodesicos e Topographicos do Reino*, Lisbon, 1850. Filipe Folque, *Suplemento às Instruções de 4 de Junho de 1850*, Lisbon, 1851. Filipe Folque, *Suplemento às Instruções de 4 de Junho de 1850*, Lisbon, 1853. Filipe Folque, *Instruções para a Execução e Fiscalização dos Trabalhos Geodésicos, Chorographicos e Hydrographicos do Reino*, Lisbon, 1858. Filipe Folque, *Instruções para os Trabalhos Hydrographicos dos rios, portos e barras e observações de marés, sondas e nivelamentos com a decripção e rectificação do theodolito*, Lisbon, 1864. Filipe Folque, *Instruções Sobre o Serviço Geodesico de Primeira Ordem*, Lisbon, 1870. Filipe Folque, *Instruções e Regulamento para a Execução e Fiscalização dos Trabalhos Geodésicos, Chorographicos e Hydrographicos do Reino*, Lisbon, 1874.

⁴⁶ Filipe Folque, *Diccionario do Serviço dos Trabalhos Geodesicos e Topographicos do Reino*, Lisbon, Imprensa Nacional, 1851. See also Filipe Folque, *Diccionario do Serviço dos Trabalhos Chorographicos do Reino*, Lisbon, 1853. Filipe Folque, *Diccionario do Serviço dos Trabalhos Geodesicos do Reino*, Lisbon, 1861.

⁴⁷ For example, the task «reconnaissance and choice of field points», corresponding to Article I of the Instructions, is decomposed in 11 sequential steps. Vd. *Diccionario...*, op. cit., 1851, pp. 5-6.

⁴⁸ Keeping with the same example: § 1 of task reconnaissance corresponds to the label «Marching days from Lisbon to the terrain in which the reconnaissance begins», *Diccionario...*, op. cit., 1851, p. 5.

⁴⁹ *Diccionario...*, op. cit., 1851, p. 3.

⁵⁰ *Instruções...*, 1850, section XI, arts. 1. and 10., pp. 42-43.

⁵¹ See, for example, António José Pery to Filipe Folque, ms., 6-9, 15-9, 23-9 and 20-10-1860, *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁵² This twin structure mirrors the structure of Service Instructions. The articles contained therein can be grouped in two sets related to the twin worlds the Instructions seek to order: those dealing with how to make science (techniques and methods) and those dealing with how to «make a state» (bureaucratic procedures). In the 1850-Instructions, articles I to VIII correspond to the first set, articles IX to XI to the latter.

⁵³ António José Pery to Filipe Folque, ms., 7-7-1860, *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP. His brother, also accused by Folque, gave the following explanation: «I am sorry for your Excellency giving me a reprimand for lack of activity, when I have employed at least as much as activity [as in last year], if not more». In 8 days, he had done 31 work hours, and average of 4/day, surveying 40 square leagues. Comparing with the previous year, he asserts that in the same period of time he had done almost three times more work, because «in these works, the better part of the day is employed in marches back and forth and in looking for station points, the best you can do are two stations per day, and most times just one», Gerardo Augusto Pery to Filipe Folque, ms., 7-7-1860, *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁵⁴ José Salema Garção to Filipe Folque, ms., 10-8-1856, *Correspondência de serviço dos officiaes*, Box I.G.C. n. 1284 «Correspondência, Diversos. 1855 a 1876», AHIGP.

⁵⁵ José Salema Garção to Filipe Folque, ms., 25-9-1856, *Correspondência de serviço dos officiaes*, Box I.G.C. n. 1284 «Correspondência, Diversos. 1855 a 1876», AHIGP.

⁵⁶ «The pernicious consequences of bad weather do not stop here: geodesists that have to climb the highest peaks of the country's mountains and to work there for many days can hardly suffer so many hardships without getting sick, which very often abbreviate their existence. In effect, the mortality of those employed in the geodetic service has been very high», in «Relatorio dos trabalhos executados em 1878-79», *Diário do Governo*, n. 224, 1-10-1880.

⁵⁷ José Salema Garção to Filipe Folque, ms., 18-9-1863, *Correspondência de serviço dos officiaes*, Box I.G.C. n. 1284 «Correspondência, Diversos. 1855 a 1876», AHIGP.

⁵⁸ José Fernandes Braga to Filipe Folque, ms., 17-4-1862, *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5, AHIGP.

⁵⁹ António Silva Valente to Filipe Folque, ms., 27-6-1862, *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5, AHIGP.

⁶⁰ Eduardo Ildefonso de Azevedo to Filipe Folque, 16-6-1860 and 27-12-1860, mss., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁶¹ Eduardo Ildefonso de Azevedo to Filipe Folque, 15-8-1861, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁶² Eduardo Ildefonso de Azevedo to Filipe Folque, 1-12-1861, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁶³ Eduardo Ildefonso de Azevedo to Filipe Folque, 11-12-1861, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁶⁴ Carlos Miranda Pego to Filipe Folque, 19-6-1860, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁶⁵ José Leite Velho to Filipe Folque, 1-9-1861, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁶⁶ Marcos Cruz Costa to Filipe Folque, 31-1-1860, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁶⁷ José Vicente Godinho to Filipe Folque, ms., 9-1-1861, *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

⁶⁸ Francisco Jerónimo Luna to Filipe Folque, 9-7-1862, ms., *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5, AHIGP.

⁶⁹ See Maria Fernanda Alegria, *A organização dos transportes em Portugal (1850-1910). As vias e o tráfego*, Lisbon, Centro de Estudos Geográficos, 1990, pp. 25-88 and David Justino, *A Formação do Espaço Económico Nacional. Portugal 1810-1913*, vol. I, Lisbon, Vega, 1987, pp. 169-303. For a foreign's eye contemporay view, see also Felix Lichnowski, *Portugal: recordações do ano de 1842*, Lisbon, Imprensa Nacional, 1844 and Maria Ratazzi, *Le Portugal à vol d'oiseau: portugais et portugaises*, Paris, A. Degorce-Cadot, 1879.

⁷⁰ José Vicente Godinho to Filipe Folque, 14-7-1860, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.

- ⁷¹ José Vicente Godinho to Filipe Folque, 16-5-1862, ms., *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5, AHIGP.
- ⁷² José Vicente Godinho to Filipe Folque, 9-5-1862, ms., *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5, AHIGP.
- ⁷³ José Vicente Godinho to Filipe Folque, 9-5-1862, ms., *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5, AHIGP.
- ⁷⁴ António Maria Valente to Filipe Folque, 7-10-1861, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.
- ⁷⁵ Alexandre Magno de Castilho to Filipe Folque, 11-7-1861, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.
- ⁷⁶ Bernardo de Carvalho Ribeiro to Filipe Folque, ms., 17-11-1862, *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5 AHIGP.
- ⁷⁷ José Salema Garção to Filipe Folque, ms., 23-9-1858, *Correspondência de serviço dos officiais*, Box I.G.C. n.1284 «Correspondência, Diversos. 1855 a 1876», AHIGP.
- ⁷⁸ Caetano Maria Batalha to Filipe Folque, 20-6-1860, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.
- ⁷⁹ Caetano Maria Batalha to Filipe Folque, 18-8-1860, ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.
- ⁸⁰ Filipe Folque to the minister of the Interior, ms., 1-7-1849, *Registo dos officios remettidos...*, Liv. n. 1, 1833-1852, AHIGP and Filipe Folque to the minister of the Interior, ms., 21-8-1849, *Registo dos officios remettidos...*, Liv. n. 1, 1833-1852, AHIGP.
- ⁸¹ Interior ministerial ordinance 7-9-1849.
- ⁸² Filipe Folque to the minister of the Interior, ms., 21-8-1849, *Registo dos officios remettidos...*, Liv. n. 1, 1833-1852, AHIGP.
- ⁸³ Filipe Folque to the minister of Public Works, ms., 23-12-1854, *Registo dos officios remettidos...*, Liv. n. 2, 1852-65, AHIGP.
- ⁸⁴ José António Braga to Filipe Folque, ms., 14-8-1860, *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.
- ⁸⁵ Carlos Freire Miranda Pego to Filipe Folque, ms., 2-10-1862, *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5, AHIGP.
- ⁸⁶ See Teotónio Lopes de Macedo to Filipe Folque, ms., 16-5-1861 ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP; Carlos Miranda Pego to Filipe Folque, ms., 28-12-1860 ms., *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP; and Carlos Henrique da Costa to Filipe Folque, ms., 30-7-1861, *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP.
- ⁸⁷ «Trabalhos Geodesicos, Topographicos, Hydrographicos e Geologicos do Reino executados durante o ano de 1870. Relatório da Direcção Geral», *Revista de Obras Públicas e Minas*, n. 28, 1872, pp. 98-102, quote. p. 100.
- ⁸⁸ José Salema Garção to Filipe Folque, ms., 9-5-1863, *Correspondência de serviço dos Officiais*, caixa I.G.C. n. 1284 «Correspondência, Diversos. 1855 a 1876», AHIGP (my emphasis). See also Arbués Moreira to minister Interior, ms., 25-7-1883, *Registo dos officios remettidos...*, Liv. n. 11, 1880-1883, AHIGP.
- ⁸⁹ Maria de Fátima Sá e Melo Ferreira, *Rebeldes e Insubmissos: resistências populares ao Liberalismo (1834-1844)*, Porto, Afrontamento, 2002, pp. 125-540.
- ⁹⁰ Folque, «Relatório...», op. cit., 1848, p. 315.
- ⁹¹ Filipe Folque to minister of Public Works, ms., 27-12-1861, *Registo dos officios remettidos...*, Liv. n. 2, 1852-65, AHIGP.
- ⁹² António Silva Valente to Filipe Folque, ms., 21-12-1861, *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP. For the complete set of original official letters, see António Maria da Silva Valente to Filipe Folque, mss., 21-12-1861, 6-1 and 16-6-1862, *Offícios dos officiaes e mais empregados. 1860 e 1861*, box n. 4, AHIGP. For a similar case see José António Fernandes Braga to Filipe Folque, ms., 3-9-1862, *Offícios dos officiaes e mais empregados. 1862 e 1863*, box n. 5, AHIGP.
- ⁹³ Filipe Folque to the minister of Public Works, ms., 26-5-1862, *Registo dos officios remettidos...*, Liv. n. 2, 1852-65, AHIGP.
- ⁹⁴ Filipe Folque to minister of the Interior, ms., 4-9-1871, *Registo dos officios remettidos...*, Liv. 3, 1865-1871, AHIGP.
- ⁹⁵ Folque, «Relatório...», op. cit., 1848, quote p. 316.
- ⁹⁶ «The full prosecution of mathematical cosmography was coincident with state cartography in a symbiotic relationship. The state's employees and contractors gained access to otherwise secret or

restricted information and thereby increased their professional and intellectual status, which was in turn parlayed into financial, professional (or military), and social gain», in Matthew H. Edney, «Mathematical Cosmography and the Social Ideology of British Cartography, 1780-1820», *Imago Mundi*, vol. 46, 1994, pp. 101-116, quote p. 107 (my emphasis). See also Almeida, *A Construção...*, op. cit., 1995, p. 347.

⁹⁷ Maria Paula Diogo, *A construção de uma identidade profissional...*, op. cit., 1994; see also Randall Collins, *The Credential Society*, Academic Press, 1979.

⁹⁸ «Their goal was to rise if not to the level of gentleman, then at least to the level of pseudo-gentry. [...] With the expansion of military mapmaking in the eighteenth century, cartography became one way for officers to get the notice of their superiors and so obtain promotion. In return, the state and its ruling elites gained three items: power through the acquisition and control of the geographic information essential for a rapidly developing industrial and militarist state; legitimation through the willing submission of loyal servants; and prestige through the visible support of the arts and sciences. Mapmaking was integral to the fiscal, political, and cultural hegemony of Europe's ruling elites», in Edney, «Mathematical...», op. cit., 1994, quote pp. 107-109 (my emphasis).

⁹⁹ Augusto Xavier Palmeirim, «Memoria sobre a Topographia Portuguesa», *Revista Universal Lisbonense*, 1st series, t. V, 1846, pp. 54-57, 68-70, 78-80, here p. 56, footnote n. 1.

¹⁰⁰ Fernando Taveira da Fonseca, «Elites e classes médias», Torgal and Roque, dirs., *O Liberalismo*, vol. 5, *História de Portugal*, Mattoso, pp. 459-477, here p. 463.

¹⁰¹ The comparative study of the social morphology of power elites across nineteenth-century Europe shows that this was a relatively peculiar trait of Portuguese historical development: Portugal was one European country in which, within the political sphere, the decline of the nobility and the concomitant ascendancy of the middle classes took place the earliest and in a most pronounced way. See Almeida, *A Construção...*, op. cit., 1995, pp. 190-196, here p. 193.

¹⁰² Giddens, *Constitution...*, op. cit., 1984, pp. 25-26, 376. Anthony Giddens, *Central Problems in Social Theory: action, structure, and contradiction in social analysis*, London, Macmillan, 1979, p. 69.

¹⁰³ James Mahoney, «Path dependence in historical sociology», *Theory and Society. Renewal and Critique in Social Theory*, 29 (4), 2000, pp. 507-548.

¹⁰⁴ Public Works ordinance 2-11-1853.

¹⁰⁵ «Carta Topographica de Lisboa: sua utilização cadastral», *Boletim do Ministérios das Obras Publicas, Comercio e Industria*, n. 8, August, 1856, pp. 92-200, here p. 101.

¹⁰⁶ Muro, Nadal and Urteaga, *Geografia...*, op. cit., 1996, pp. 131-147, here p. 147.

¹⁰⁷ Art. 1 of ministerial ordinance 5-5-1859. See Francisco Maria Pereira da Silva, *Resposta ao relatório da comissão de syndicança feita à Direcção Geral dos Trabalhos Geodesicos, Topographicos, Hydrographicos e Geologicos do Reino requerida pelo Contra-Almirante Francisco Maria Pereira da Silva*, Lisbon, Imprensa de J. G. de Sousa Neves, 1881.

¹⁰⁸ Filipe Folque to minister of Public Works, ms., 28-3-1859, *Registo dos officios remettidos...*, liv. N. 2, 1852-1865, AHIGP. On the scarcity of cartographic information with which to help draw electoral constituencies, see Pedro Tavares de Almeida, *Eleições e caciquismo no Portugal oitocentista (1868-1890)*, Lisbon, Difel, 1991, pp. 49-51.

¹⁰⁹ Pereira da Silva, *Resposta ao relatório...*, op. cit., 1881, pp. 36 and 40.

¹¹⁰ Alegria and Garcia, «Aspectos da evolução da Cartografia Portuguesa (séculos XV a XIX)», in Maria Helena Dias, ed., *Os Mapas em Portugal*, Lisbon, Cosmos, 1995, pp. 27-84, quote p. 76.

¹¹¹ Suzanne Daveu and Júlia Galego, «Difusão e ensino da Cartografia em Portugal», in Maria Helena Dias, ed., *Os Mapas em Portugal*, Lisbon, Cosmos, 1995, pp. 98-100.

¹¹² See definition of concept in Nikolas Rose and Peter Miller, «Political power beyond the State: problematics of government», *British Journal of Sociology*, 43 (2), 1992, pp. 173-201.

¹¹³ See the use of the concept in Matthew Hannah, *Governmentality and the mastery of territory in nineteenth-century América*, Cambridge/New York, Cambridge University Press, 2000.

The (slow) acceptance of the metric system

From Nature to Society, and everyday life

*Long Live Maria Bernarda
With her scarf round her neck
The new taxes on the ground
And the kilograms down the well*¹

The reform bill

The metric reform bill of December, 13, 1852, was meant to put an end to the chaos and anarchy supposedly typical of a backward, *Ancien Régime* country. The decree's preamble is paradigmatic of the enlightened worldview pervasive amongst Portuguese liberal ruling elites. The legislator makes it clear that the desired civilizational change in the body of Portuguese society could not compromise with localisms and particularisms, even if backed up by tradition. Such relics were to be replaced by a rational and enlightened conception of «good society» and government. Therein, the reader is transported to a kind of courtroom, where the legislator, sitting as judge, is passing a verdict on the comparative merits of the metric system versus the old, extant system. In the role of judge, the legislator calls upon Nature and Society to produce the accusation of the old system: «Portuguese weights and measures cannot but be convicted and prohibited in the name of enlightenment and public convenience. With no foundation whatsoever in Nature [...] Different in each province, in each municipality, from parish to parish even, our current measures, incoherent, with no relation between themselves, with no proper order, nor systematic nomenclature, make up a distorted body which it would be inappropriate to call a legal system of weights and measures».²

The legislator sought to solve a double paradox: bad as they were, old measures were the fruit of Portuguese history, a result of former kings' rule. The metric system was putatively magnificent, but was it not alien to social mores; in point of fact, was it not *French*? In order to bandage the wound thus introduced in historical continuity, the legislator exempts «ancestors» from either guilt or mistake. Times they are a-changing: *before*, economy and society had no need of a system such as the metric, nor could science provide it; *before*, intra-national and inter-national commerce had not «attained today's colossal proportions»; *before*, rapid communications did not bring distant populations together into a single country as nowadays. Municipalities, once «the most complete example of social life», have put their interests before the state's. Driven by prejudices, rivalries and local spirit, they have put up «secondary borders inside the nation's territory». *Today*, the thrust of civilization erodes those barriers and blends every village «into a single political and economically homogeneous body». «Artificial» and «variable» measures could be tolerated *before*, when markets were local and industrial and commercial vigour was lesser.

Next, the legislator introduces the decisive argument: the (new) nation. It was a risky move. Was there not a nation before? To be sure, but, moving from an organic solidarity to a mechanical solidarity concept of national society, he argues: *before*, contrariwise from today, «predominant customs, necessities and ideas did not oblige the farthest populations to engage in a continuous and reciprocal interaction». «Nowadays», that intimate interaction constituted «very tight national parenthood relationships». Together with a shared language and a shared currency, uniform weights and measures «translate the political unity of the nation into a material fact». Finally, summing up:

«When political unity is established in Portugal by the *Carta* [the Constitution], and by common Law; when moral unity grows and perfects itself by means of ever increasing sympathies, and by the glorious traditions of a shared cradle; when

literary unity exists by the affinity of a common language, almost without dialects and variants in all the realm; when industrial unity strengthens itself in the efforts of an entire population; when the spirit of communicability develops in a progressive scale, and the outer provinces of the kingdom long to embrace one another, to blend together, to tighten their relations, and sociability, it would certainly be a deplorable exception to maintain the incoherence of the current system of weights and measures».³

Oliveira Martins once wrote: «*Regeneração* is the Portuguese name for Capitalism».⁴ In the legislator's rhetoric, Portugal was undergoing a civilizational sea-change. New circumstances and needs required new policies. Not completely new, but new to the extent of complete difference, a modern nation was in the making. The reasons presented, in the wishful thinking of the legislator, as causing the need of the metric system might, in fact, be its consequence, and that of a set of development policies deployed at the time, called «*Fontismo*». Is it really Portuguese economic modernity that demands the metre, or is it rather that the metre will bring said modernity about? The performative discourse and underlying normative assumptions which brought in the metric system work as a self-fulfilling prophecy. «In themselves» not real, they are real in their consequences.

The more the legislator argued the new system was a material embodiment of the nation, the harder it became to explain why such an artefact should have a French origin. Would not a French system best represent France? The government wanted to «naturalise in Portugal an institution» that «cannot be described as an imitation borrowed from this or that nation». The «scientific and industrial uses» of the «French legal metre» are «European and cosmopolitan». More to the point, the metre is deduced from Nature, is Nature itself; and Nature – being the very definition of the universal – evades the local and the particular. That is why it warrants «invariability for all eternity, not only for all places within a country, but for all places on Earth».⁵

If it could be argued that the metre had its origins in Nature, the same was harder to say of the decimal partition. Non-decimal partition was the old system's other trait which «suited people's habits». Herein, the chosen argument was simplicity, perfection and economy. Objections and inertia derived «from tradition, inveterate usage, and common prejudice [will] be mounted against the argument [...] of perfection, simplicity, and economy of time. The extant system will not be able to adduce similar reasons for its defence, because multiples and fractions of each measure are whimsically determined».⁶

Furthermore, there was the issue of the names: should one retain old names or rather use the new Greek-Latin ones? The government was aware that new names were precisely that, «entirely new to common people». In the past, this had been a powerful argument against the implementation of the system, put forward, one learns, by «shy and hesitant spirits». Such an apparent disadvantage was now transformed into an opportunity to be seized. Also, it offered the legislator yet another chance to display his enlightened avant-gardism: if ancient designations were kept, the government «would be limited to an incomplete innovation, displaying, by falsely abiding by particular prejudices, every symptom of a shy reform [...]». To designate new measures with old names would help further in common usage the memory of, and superstitious affection for, ancient standards [...] it would create a rightful distrust, and indirectly favour fraud in commerce, anarchy in measures, and unfaithfulness in business transactions».⁷

In contrast with former emasculated reformers, here it was the maximal version of the reform, displaying an almost merciless quality. The more striking feature of the 1852 reform is the coupling of a rigid strategic conception with a tactical flexibility. Nowhere is this more apparent than in the deadline issue: «the immediate adoption of the metric system, disregarding resistances and difficulties stemming from habit and

ignorance» would jeopardize the bill's success. A ten-year transition period was set. This was something the government had learnt from the previous half-century of trial and error: it would now be able to set to its convenience the deadlines for the mandatory use of new measures. Little by little, people would grow accustomed to them. Once ingrained in the practice and customs of people, the system would be soundly established. In fact, it would be as soundly established then as the old system was in 1852.

The bill starts off by formally adopting «the French legal metre» as the base of the legal system of weights and measures in Portuguese European territory (art. 1) along with the metric-decimal nomenclature of base units, multiples, and fractions (art. 2). It sets a ten-year deadline (art. 3). Within the transition period, the government was free to choose the most suitable epochs to enforce particular components of the system, or to make its use compulsory for particular professional groups, institutions or public departments. As long as the whole system was in place by 1862, the government could begin with those measures considered easiest to enforce (art. 4). However, six months before any of these epochs, the government was obliged to distribute standards to municipalities and publish conversion tables (arts. 5 and 6). From the moment any component of the system (say, linear measures), and obviously the entire system after 1862, was enforced any other measure would be considered illegal, and the production, sale or use of such measures punished with fine or imprisonment, depending on the circumstances (art. 7). From then on, any contract, pension, debt or tax would be paid according to the new system, as with every notary act or record (arts. 8 and 10). Every pecuniary or imprisonment penalty would be subjected to judiciary procedure and be decided by court ruling (art. 12).

The Department of Weights and Measures

As for the institutional framework, the Central Board of Weights and Measures was created in the Ministry of Public Works. The Board would be headed by the minister, and staffed by five members from two high consultative councils of the Ministry. The Board would elect a vice-president and a secretary (art. 13). The competences attributed to the Board were strictly consultative, specifically: to advise the government on law proposals, regulations or instructions; to co-ordinate the making of conversion tables between old and new measures; to superintend the fabrication of the new measuring standards; to present the government with a yearly report (art. 14).

In February, 1853, the Board was staffed: the minister, Fontes Pereira de Melo, chaired; Marquis of Ficalho, João Crisóstomo de Abreu e Sousa, José Ferreira Pinto Basto, José Maria Eugénio de Almeida, and José Vitorino Damásio were appointed members. This was a mixture of aristocracy of birth, engineers and important aristocratic or bourgeois landowners. Highly placed in public officialdom, they all shared strong Liberal convictions.⁸

The Board was created as a consultative body, an «experts committee»; its main duty was to advise the government. However, such a profile was contradicted *in potentia* by one of its assigned tasks: to co-ordinate the making of conversion tables. Within a couple of years, the strictly consultative profile came to be a constraint because the Board was, in fact, taking executive decisions, such as hiring personnel and making expenses.⁹ It needed to acquire executive powers and a logistical structure. The need to change the Board's profile was already evident by the beginning of 1855. The functional pressure to morph into an executive profile was high, should the government really wish to implement the metric system. A number of reports detail this issue.

In the yearly report devoted to 1855, the Board stated it had faced «profound difficulties» in proposing a more suitable organization of the department: «The current organization is deeply flawed. In general, municipalities auction the gauging service, and the gaugers who bid highest usually lack the necessary education, and care solely to pay for the auction bid with gauging revenues».¹⁰ As a follow-up, the secretary Fradesso da Silveira was sent to Belgium and France to study the organization of the gauging inspection of the Belgian and French counterparts. He wrote a report, sent to the minister of Public Works, and later published in the official gazette.¹¹ While in Paris, Silveira bought material and utensils to equip a future Central Gauging Station. To operate the new instruments three Army officers, two skilled workers, and two manual workers were appointed.¹²

Overseeing practical works was not in the Board's purely consultative profile. That is why, in a memoir dated 13-11-1855, the Board first proposed the creation of a General Inspection of Weights and Measures («to supervise the service of weights and measures in the whole country, centralising it, which is the only way to carry it out effectively») and a Central Gauging Station.¹³ This proposal was repeated and confirmed to the minister in 14-12-1855. A Public Works ordinance of 18-12-1855 authorized the Board to draft a proposal for the provisional organization of both. Following said authorization, the Board presented (March 1856) the first budget estimate for a General Inspection and a Central Gauging Station, complete with personnel. Lisbon's Inspection would cost 3 368\$70; twenty district Inspections, 18 252\$00; travel gratuities, 5 000\$00; collections of instruments, utensils and measures for Inspections, 12 000\$00; total sum, 38 620\$70. The capital's Inspection would be staffed thus: inspector general, secretary general, two assistants to the inspector, chief gauger, first-gauger, two second-gaugers, two gauger's assistants, four assistants to the

gauger's assistants, two civil servants, and four workers. District inspections would be staffed thus: inspector, assistant to the inspector, second-gauger, assistant to the gauger, civil servant, and worker.¹⁴

In June 1856, Joaquim Larcher, head of Public Works' General Office, briefed his new minister (from early June there was a new, centre-left cabinet in office, headed by the Duke of Loulé) in all matters pertaining to the Board. Therein, he acknowledges the Board had proposed the creation of a General Inspection, and had also estimated a provisional budget. However, he himself says nothing in favour of the plan.¹⁵ November 30, 1856, 37 officers were requisitioned to the Ministry of War to staff the would-be district inspections (Lisbon's was already staffed). March 1857, the Board's president, the Marquis of Ficalho, used the annual report to pressure the new government into a decision:

«After having studied the matter and examined the gauging service in the countries where the metric system is already in place, the Board has devised a project according to which this service, and the whole service of the new weights and measures system, thus far charged to a consultative body, will be charged to a special technical Department, which will be called *General Inspection of Weights and Measures*. The head office will be located in Lisbon, and its action will reach every hamlet in the country by creating *District Inspections*, to be set up in each Administrative District». ¹⁶

Meanwhile, the Board had been seeking all along to put on additional pressure by setting up optimistic enforcement deadlines, namely for the metre: the first semester of 1856, then January 1857. There would be no enforcement without a logistical structure to back it up. This crescendo of pressure resulted in very little. July 1857, Larcher wrote to his minister defending the Board's case. He argued that the Board's «consultative nature» had been superseded by events; it had already gathered the necessary load of information and already had skilled enough officials to staff a few district inspections;

district inspections ought to be set up, under the headship of the inspector general; the Board was ready to deploy five district inspections (the Lisbon inspection had already been created); finally, he asks for additional monies to this effect.¹⁷ By September 1857, Silveira was very disappointed. He complained to Larcher: «Never was such devotion paid with such scorn».¹⁸

At last, the General Inspection of Weights and Measures was created by Public Works ordinance of 16-3-1858, along the lines proposed by the Board in March 1856. Fradesso da Silveira was appointed Inspector General. Funds came from an extraordinary credit (decree 20-2-1858), sum total: 10 672\$00. One of Silveira's first decisions was to staff district inspections, invariably appointing military officers to head them or to assist the inspector.

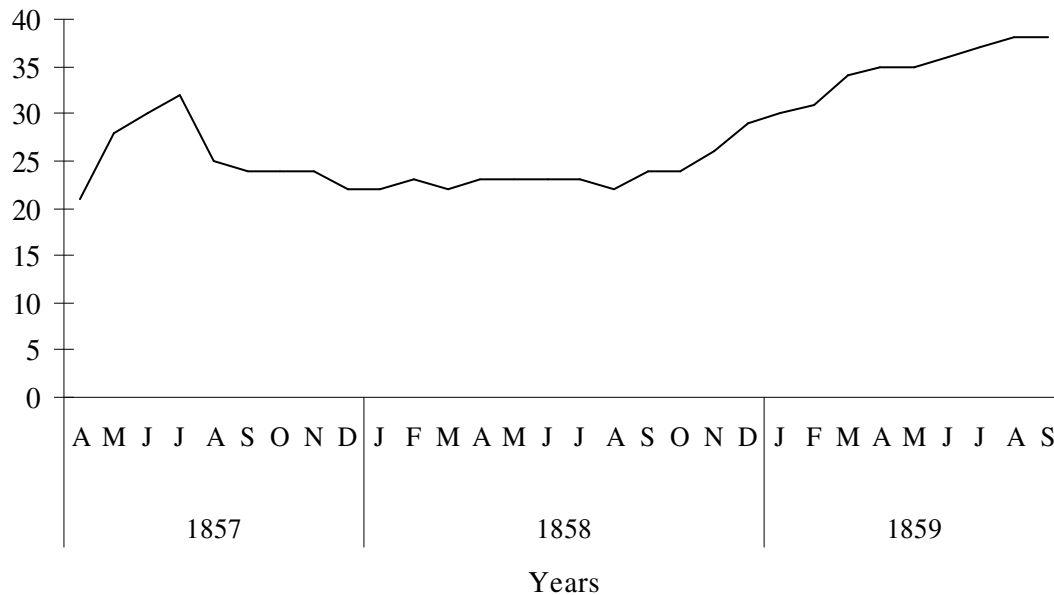
Both the 1858 institutional reform and the decision to undertake an ambitious series of inspections resulted in a sizeable personnel growth. This was explained by the need to staff newly created district inspections. The latter were staffed in two waves: in 30-4-1858 and in 7-2-1859. Nevertheless, the trend is clear: Silveira was right when he repeatedly stressed that the Board's need to gain executive competencies required a territorial structure, which would allow inspective procedures, provide the head office with an information network, and set the institutional context for interaction with local authorities. In a report addressed to the minister of Public Works, published in 1859, Silveira offers a commentary on the history of the Inspection since 1852, which is not devoid of some bitterness:

«The *Central Board of Weights and Measures*, being devoid of any pecuniary resources, and with no strength, it was only natural that the Board would hesitate, and that its first steps would be tentative, in the face of a law whose wording demanded explanations, which were never given.»¹⁹

Graph n. 4

Board of Weights and Measures' personnel

1857-1859



Source: DGCAM RC 38, AHMOP.

On 29-12-1860, the General Inspection was extinct and replaced by the Department of Weights and Measures. Silveira retained headship. Again, district inspections were created; this time, they would work alongside district departments of Public Works. In all, the main feature of this reform was to put the gauging service under the tutelage of municipalities, to Silveira's despair. He thought municipalities unfit for such an important job, for lack of skills, political will, and vocation.

The social construction of acceptance

Over the years, the Board created an assemblage of devices to generate acceptance of the system, supported by three major pillars: the law, the school, and the administration. Only the interplay between them, so that they would work *together, at the same time, and towards a common goal*, could confer the system legitimacy and beget compliance from the people.

It is useful to draw an analytical distinction between coercive, normative and social-practical dimensions of the new metrology, *qua* law. On the one hand, the system was a legal one, *ipso facto* enforceable by the judiciary and police apparatuses. On the other hand, as with any legal text, the «metre» embodies, is supported by and reproduces a set of normative considerations on society, the state, progress, the individual, trust, and so on; finally, it was not until the law became ingrained in the everyday usage of peasants, shopkeepers, wholesale merchants, municipalities, public departments, etc., that the system could be said to be *in practice*. To be «diffused», the system had to be appropriated, and then passed on by every knot in the network.²⁰

Very perceptively, Gramsci has thus articulated the relation between the educational and formative role of the state, the importance of school as generative *locus* of Liberal citizenship and the role of law in naturalising external structures, many of them normative, into subjective dispositions and practices, experienced as spontaneous by individuals (as with the metric system, I argue):

«[The state's] aim is always that of creating new and higher types of civilization; of adapting the 'civilization' and the morality of the broadest popular masses to the necessities of the continuous development of the economic apparatus of production [...]. But how will each single individual succeed in incorporating himself into de collective man, and how will educative pressure be applied to single individuals so as to obtain their consent and their collaboration, turning necessity and coercion into 'freedom'? Question of the 'Law': this concept will have to be extended to include those activities which are at present classified as 'legally neutral', and which belong to the domain of civil society; the latter operates without 'sanctions' or compulsory 'obligations', but nevertheless exerts a collective pressure and obtain objective results in the form of an evolution of customs, ways of thinking and acting, morality, etc.».²¹

A number of administrative novelties were developed to go along with the legal framework. Beyond the penalties in the law, the tricky issue was to enforce the law

itself. The generalisation of inspective practices was a powerful instrument to this effect. Another was the «popularisation» of the system – a permanent concern of the Board. The implementation of the new system depended substantially on the ability to congregate different and often competing public departments: the Board, Public Works, the Interior, and Finance; at the local level, prefects, education authorities (under the Interior's jurisdiction), elected municipal bodies, and municipal administrators. Furthermore, it was necessary to come to terms with merchants, shopkeepers, butchers, bakers, etc. A connection with the Church had to be secured so that priests would uphold the system. Finally, whenever there was a breach, the law had to be enforced through the judiciary system (police investigation and court ruling). Every single one of these aspects presented problems, in them, and in-between them.

The inspectorate

In order to acquire an institutional frame that would fit the set of executive profile acquired in 1858, the Board created the inspectorate.²² The production of «conversion tables» demanded a territorialized structure composed of district inspections. The presence of inspectors in the localities embodied the relationship of administration and sovereignty between the centre of political power and the peripheries. To carry out comparisons, to lecture elementary schoolteachers or to oversee the employment of new standards are activities interesting from a negotiation viewpoint. How did inspectors act in the localities? Upon whom did they rely?

Their agency relied heavily on the co-operation of prefects, municipal administrators, aldermen, parish priests, shopkeepers, bakers, fishmongers, and so on. For instance, inspectors were told to carry out all measuring and comparing in a public session, in the presence of the elected president of the municipal body.²³ This simple procedure generated effects of three sorts: trust, truth, and government.²⁴ Trust stemmed

from publicity and quantification. The fact that the procedure was public ensured that people would not feel deceived or in any way resentful. The Inspection was not wrong in thinking publicity was the cornerstone of a trustworthy administration. The fact that the procedure (comparison) was quantified and witnessed begot its own specific effects, given the role of quantification and objectivity as technologies of social trust.²⁵ The same elements explain the production of scientific «facts»: publicity vouched for the exemption of vices; witnesses, as in courts, could attest to the moral/ethical correctness of an otherwise technical process. The veracity of results (people believing one *vara* was equivalent to x metres) sprang from procedural confidence and scientific rigour. If people in a certain municipality believed their own results, then, the procedure being everywhere the same, they would believe the results in neighbouring municipalities with which they had commercial exchanges without ever feeling cheated. At the end of the day, the metric system would be that much closer to acceptance. Such proceedings also generated government effects: compliance with the reform would follow from the fact that populations did not feel deceived. In fact, if the metric system was not that harmful, but actually better, as the inspector strenuously averred, why not use it?

How to make the metric familiar

Lengthy reports enumerating the Board's deeds and asking the government for action were typical of the mid 1850's. In one of them, the Board presents 16 requests, four of which concerning the schooling system. Actually, «the school», the elementary school, took a leading role in what was termed «popularisation of the metric system». «Popularisation» was to be the core issue in the smooth acceptance of a completely alien artefact. Thus, the elementary school was construed as the fundamental *locus* of reform. What was to be done? The metric system should be adopted in every school, public or private, every public elementary school should be provided with a number of

compendiums, every school should possess a collection of metric models, at the scale 1:1, and their use ought to be made compulsory.²⁶ Interestingly, a major source of publicity was sought in the edition of small, inexpensive booklets explaining decimal arithmetic and the metric system, having simpleminded common people as expected readership. The confidence put in this particular medium is ironic in the context of overwhelming illiteracy. The Board's secretary, Silveira, wrote a *Compendio do novo systema legal de medidas*²⁷, to be used as manual once the teaching of the metric system was declared mandatory. The booklet was to be distributed at the government's expense by every prefecture, municipality, and public department, and, again at the government's expense, to every elementary school – such were the Board's proposals in 1855.²⁸ 2 000 of these manuals were printed at Silveira's expense to be distributed to schools, which, by September 1857, had not yet received any, though they had been sent to the Interior in November 1856. Finally, in September 1858 it was decided to print 20 000 copies, of which 19 500 were sent to the Interior to be given to schools. On 18-9-1858, the government chose said compendium as the official school manual.²⁹

In 1856, the Board pointed out seven conditions for the «the fulfilment of its mission». One of them, indeed the first, was to popularise the system. Having in mind the difficulties faced by the metric system in countries such as France, Belgium and Spain, the Board considered that «people's habits and prejudices, which cannot be suddenly destroyed, greatly hinder the work» of reformers. How to make people familiar with it? Elementary schooling, a deluge of metric models, and the publication of conversion tables were the stock answers. In this way, the Board reasoned, «the senses will get used; the spirit will acquire the knowledge of the legal system one seeks to establish. Little by little, in every strand of society, the new standards will be acknowledged and their advantages recognised»; and then, the sound bite: «Without

education the law is as good as dead, for no government musters the might to carry it out». Thus far, what the Board had to show was a booklet of the new system and conversion tables. Next, it would be necessary to distribute the compendiums, provide every public department and every school with conversion tables, and make the teaching of the system compulsory, applying penalties to public teachers who failed to do it and requiring its knowledge for those applying for professor or to any public employment.³⁰ This was also Larcher's stand.³¹ However, first and foremost, to make popular meant to publicise. «Publicity, dear minister, is the first, most efficient and infallible means to achieve results. In the current state of affairs, it is necessary that the government sponsor publications, stir publishers, and favour as much as possible the diffusion of knowledge, required by the adoption of the system».³² Indeed, that much had been understood by earlier governments and committees struggling with previous incarnations of the metric reform.

Managing administrative interaction

Interaction between administrative authorities, and between them and the general public, had to be steered. The landscape for implementation was crowded with an assortment of actors: ministries and general departments; local authorities, elected municipal bodies, municipal administrators, and parish commissars; prefects; and the judiciary system; the Church, often the Army; and, finally, «the people», from urban crowds to peasants; from shopkeepers to millers.

One should not assume that because some entities are placed under the administrative authority of others they *ipso facto* transmit, diffuse or regulate upward or downward fluxes of information and power in some sort of frictionless void. To the contrary, the enforcement of the metre shows that each knot of the network has the capacity to withhold information, delay execution, or outright non-compliance. That is,

from the fact that the ministries of Public Works and Interior are integral parts of the same administration does not follow that demands presented by one to the other are accepted, much less *immediately* followed. Every hierarchical layer has the capacity to impose a bargain, to cut a compromise – unlike a clockwork mechanism.

Comparing old and new standards: the 1858 inspection and reports

Early on, the Board trusted the comparisons previous committees had done, namely those of 1817 and 1820, not hesitating to endorse extant conversion tables.³³ Why the change of mind? Comparisons were ordered not because earlier comparisons were defective but because the Board realized that many changes in standards had come to pass, jeopardizing most of the previous work.³⁴ Furthermore, it was discovered, a number of municipalities had not sent their old standards to Lisbon to be compared, and subsequently destroyed in 1817, thus not having the «new» 1820 standards, remaining at bay from the process. Loss, deterioration and negligence explained differences between results yielded by earlier comparisons and the latest ones, «derived from direct experiences and observations in every municipality of the kingdom».³⁵

No doubt, what struck inspectors the most was the variance of measures from municipality to municipality, and even from parish to parish within the same municipality. The heterogeneity varied according to the kind of measures, being slighter in linear measures, and greater in weight and, above all, capacity measures. It is the relatively low degree of variance of the linear measure that explains why the reform was first implemented in linear measures. A single illustration of this point must suffice here, although almost every single report stressed the topic.

«The commission cannot fail to observe that the distances separating these municipalities being so short, whose peoples are in permanent commercial interaction, it is worth stressing the extravagant variety presented by the standards

of some when compared with those of others, and most of all the existence of six standards in the same municipality, as in the case of Mafra.»³⁶

Guarda was the extreme case of this state of affairs. In the district's 14 municipalities, the inspector found no fewer than 38 different standards of general measures (12 of which in a single municipality, Ceia) and 14 standards of special measures (measures used for specific purposes or foodstuffs) – 9 of these in one municipality, Ceia. The causes and consequences of this situation are ambiguous. It creates the opportunity for speculation and fraud from wholesale traders, who have a different perspective of the market than the local shopkeeper or ordinary client: the situation is confusing and they excel in taking advantage of that confusion.

«From such a great diversity of measuring standards results that only the scarce number of people who know exactly the differences from one to another can trade with advantage, while the majority of the population suffers continuous and often harsh disadvantages in their purchases and sales».³⁷

On the other hand, traders are just accommodating their clients' demands. The same report informs that traders carry different measuring standards to marketplaces, selling and establishing different prices according to the buyer's preference for one or another. If they do not, they simply will not sell their products.³⁸

Why did Ceia have so many standards? A series of territorial reforms had deeply redrawn the Portuguese administrative landscape since the Liberal revolution, leaving behind an important metrological heritage. Parishes from extinct municipalities annexed to other municipalities usually kept their standards and measuring procedures, adding to an already confused state of affairs. To have a notion of the magnitude of the reduction, let me recall that in 1826 there were 816 municipalities, after the liberal reform of 1832, there were 465; after 1836, 351; finally, after 1855, only a few years before the reports were written, 305.³⁹

Another important finding troubled inspectors: in almost every municipality, a breach was found in the relation between the standard unit and its multiples and fractions. For example, if one took a capacity measure for solids, like the *alqueire*, one would find that the half-*alqueire*, measured twice, yielded a different volume than the standard of one *alqueire*. According to reports, the breach of relation between various metrological layers affected linear, weight and capacity measures alike. In all 12 municipalities in Leiria, not a single measuring standard kept its proper relations, leading to the following outburst:

«the commission was amazed to get from all standards and every Municipality a formal and unanimous repudiation of the tenet of exact science that states that if you take and add up the number of fractions into which the standard unit was divided you will get the entirety back again. The commission can absolutely certify without fear of exaggeration that no standard unit multiplied or divided by the relation given to it by arithmetic yields the result it ought to.»⁴⁰

The break in the relation between the standard unit and its fractions took on various forms. In Santarém, for instance, smaller measures were proportionally «stronger» than larger measures (their capacity was greater than it should be). To buy wholesale (larger measures) and sell retail (strong fraction measures) would be clearly disadvantageous.⁴¹ Region A produces wine to export; its capacity measure for wine would be smaller than the equivalent of region B, which imports wine. However, region B produces cereals to export, which is not the case of region A. Thus, conversely, capacity measures for solids of B would be smaller than those of A. This was the case between municipalities within the district of Horta, in the Azores.⁴² Finally, in local economies based on the export of goods to foreign markets, like Madeira archipelago, there was the use of foreign measures such as the gallon and the peck, introduced by the British, as consequence of the great trade volume of spirits and wine with the isles.⁴³ These examples clarify the extension and limits of local and regional economies. The marketing of goods in an

economic space at the nationwide level could not compromise with such distortions in the formation of prices.

Only the foul organization of the gauging service explained this state of affairs. Usually municipalities auctioned the gauging of standards for a certain price. The people who bid in this auction were described as incompetent and solely concerned with getting enough money to pay the municipality and make some profit of their own. They looked at the gauging procedure simply as a source of income and not as an important inspection service. Reportedly, municipalities handed over standards to gaugers without caring whether the service was properly conducted, their only concern being to get the revenue at the end of the year. In the district of Guarda,

«Most of the times [the gaugers] inscribe the gauging mark upon the standards without measuring them, and in many cases, not even that, they are happy to collect the gauging fee from the shopkeepers without evaluating them, nor inscribing any kind of mark in the standards – as a number of them declared to me».⁴⁴

The indirect taxes levied by municipalities were another source of corruption in standards. A number of taxes, namely on wine and olive oil, were established upon the measuring standard itself, provoking a change in the standard's number of fractions. For example, the *almude* (capacity measure for liquids) would have 14 *canadas*, instead of the regular 12. That is, the retailer paid the municipality the tax on the wine and then passed it along to the final consumer by changing the number of *canadas* in a single *almude*. The wine producing district of Funchal (Madeira archipelago) provides the illustration:

«The indirect tax according to which people in this district receives as a *canada* a measure smaller than the *canada*, and pays as if it were the true *canada*, is an onerous tax [...] is a fraudulent tax, and finally it is one of the causes of disorder and confusion in this district's measures».⁴⁵

The reports are shot through with partisan comments on behalf of the adoption of the metric system. These comments depict a proselytizing attitude. In all its rationality, proportion and almost natural character the new system was usually pitched against the chaos and anarchy of the extant system. In the comments, one can also ear a powerful echo of the «development» *ethos* of the «Regeneration» regime. Allow me to give a striking example:

«The equalization of the kingdom's measures was a necessity claimed by everyone; the same way the equalization of measures in the world is a necessary consequence of the century's industrial exploits. Faster thoroughfares are opened; because moving around is ever so much easier, people get to be in closer contact; commerce has been quickening its pace; industry and agriculture develop more and more; and measures people use in their transactions remain in such a chaos, only a system entirely new can redress it».⁴⁶

In fact, the smoothing of commercial fluxes-argument is used repeatedly.

«in the epoch when internal commerce was restricted to the exchange of products in the same place they were produced, inequality of measures from municipality to municipality was not very acute. Nowadays, given the development of public transportation, to which the government is so attentive, contributing to increase the number of transactions between one place and another, even between the farthest ones, uniformity of measures comes to be necessary as a powerful means of easing those transactions».⁴⁷

Hence, the extant system is chaotic and harmful to both people and commerce. But this is a conclusion people only reach after the comparative process is finished. It did not escape the inspectors' attention that their agency in the municipalities contributed to make the metric more acceptable, even if not fully understandable.

«The commission [...] concluded that the people feel deeply the harmful effects of the inequality of measures from municipality to municipality, from parish to parish; they will gladly embrace the metric system, whose benefits the commission, through explanation, has worked to make even more clear and relevant to them».⁴⁸

This process took place at the local, but also at the central level. The publishing of reports in official journals such as the *Boletim do Ministério das Obras Públicas, Comércio e Indústria* contributed to the overall purpose of debunking the old system and establishing the new one by exposing the heterogeneity in measuring standards.

«The innovation has been well received everywhere and by everyone, which clearly proves the discredit of old measures. Their discredit has been heightened by the comparisons which have been carried out and by the reports that have seen print».⁴⁹

In nearly every report, inspectors acknowledge the help and cooperation received from local authorities, whether they were prefects directly dependent on the Interior, or locally elected bodies, such as the municipal president and aldermen. Ordinary people are described as being eager to embrace the metric system, especially *after* watching comparisons being carried out. This rosy picture will later be clouded by reports on the teaching of the metric system and on the actual implementation of the reform. Some references appear already to the fact that the metric system is not being taught in elementary schools.⁵⁰

Ostensibly, the reports describe objects of administration – but not only. By making use of a proselyte and missionary rhetoric, they also describe the centre. They mirror the administrative mind which commanded them in the first place: the enlightened underpinnings, the despair of an administration which may lack in efficiency but surely abounds in newly converted zeal.

«Conversion tables» work as a dictionary translating two different metrological languages. To make the equivalences known was no less than indispensable so that everyone could continue to measure, weigh, trade, and pay taxes. The tables, making the correspondences readily visible to the simple gaze, were also fundamental to people in their everyday life, thereby helping the new system to replace the old one in the customs of peoples. Conversion tables enabled the *visualization* of differences between

local points and a central standard, and, more powerfully, exposed the extraordinary variety between local points. The comparison made visible, thus that much more real, the metrological dissonance the metric system wished to silence. As a matter of fact, reading the tables produces the cognitive effect of a cacophony. The carrying out of comparisons and the publicity of their results offered a poignant illustration of the vicious nature of the old system, providing the supporters of the metric system with an authoritative argument.

The diffusion issue

Publicity alone, whether in the form of compendiums, handbooks or pamphlets was, though indispensable, not enough. It was necessary not only that the system be known and rationally understood, but also that it become ingrained in social habits. Schooling and public lectures emerged as the preferred answer to the question on how to make people familiar with this novelty.

Before the series of lectures to elementary schoolteachers began, early in 1859, the Inspection was aware of what was going in the country. Some reports devoted to comparisons display opinionated remarks on how the system is not being taught at all, and on how helpful it would be to distribute compendiums, scales, and of course conversion tables, to every school and teacher. In Lisbon, the inspector was «deeply amazed» to find that no school had even began the teaching of the metric system.⁵¹ In Castelo Branco, the inspector exposes the «everywhere evident» lack of teaching of the metric system, which, if continued, «will doubtlessly preclude the execution of a system which, established amidst those who cannot appreciate its beauties, nor even come near to understand it, will face obstacles difficult, if not impossible, to surmount».⁵²

The leading character

Not surprisingly, reports are packed with remarks on schoolteachers. The latter were predominantly male and state-employed; there were also female teachers, exclusively in female schools, and teachers employed by parishes, usually priests, or municipalities. There was a considerable number of privately owned schools, and even private teachers who lectured at home. The attention paid to teachers is understandable if one recalls their functional role as relay. To the mind of public officials, the smooth diffusion of the metric depended on their role as brokers, not only faithfully reproducing the message, but also convincing pupils of the system's superiority. Thus, perceived shortcomings in their ability to teach correctly and convincingly were seen as attrition in the machinery of diffusion. The awareness of such constraints, whatever their nature, usually produced a caustic tone. Inspectors were especially struck by the «ignorance» that pervaded their feeble spirits.

«[I]n general, teachers are very backward and their knowledge is too deficient to enable them to, wholly and quickly, deepen their understanding of the system [...] and therefore, only at great cost will they be capable of transmitting to their pupils rigorous ideas to this respect, and overcome difficulties and reluctances that lay people oppose to innovations».⁵³

Worse still, schoolteachers displayed worrying signs of not possessing the most basic tools of their trade.

«In this district, honourable exceptions aside, elementary schoolteachers barely know how to read, write, and count [...]. Almost all of them ignore the basic rudiments of Portuguese grammar, and very few are familiar with the simplest notions of our country's geography and history».⁵⁴

Some were not even privy to the concepts of quantity and unity.⁵⁵ «This quasi-absolute lack of knowledge is coupled with such sterile intelligences that it was very hard work to make them grasp the simplest things».⁵⁶ Old age and a «naturalised» social

background obscured the clarity of their spirits, like grey clouds in the sky through which light hardly ever penetrated.⁵⁷

In addition to ignorance and backwardness, the elementary school was plagued by an embarrassment of pedagogical methods. The teaching of the metric system coincided with a phase of rapid change in teaching methodologies. The 1860's were the stage for a never-ending polemic on alphabetisation methods between the Lancaster method, the so-called Castilho or Portuguese method (authored by the poet António Feliciano de Castilho), and the «*Cartilha Maternal*» method (authored by the also poet João de Deus). This polemic is but an indicator, along with the flourishing of journals and significant legislative output, of the importance of pedagogical debates.⁵⁸ Not surprisingly, all this diversity was perceived by inspectors as chaotic. How could the seed of standardization flourish in the land of confusion? Porto's district inspector drew a very telling analogy:

«I cannot [...] hide from Your Excellency [...] the pervasive confusion in schools concerning compendiums and teaching methods. Every teacher has his own compendium, in the same way each village has its particular capacity measure; and each teacher has his own particular teaching method, the same way each village has its own measuring method. They are so different and disparate that I would not exaggerate to confide I was nearly convinced I had changed country just because I had changed town or school».⁵⁹

Nevertheless, one can perceive causes for the rigidity of the schooling system, or its inability to absorb and then diffuse innovation, other than teachers' ignorance and feeble-mindedness. The schoolteachers' potential resistance to innovation was just a demonstration of their ability to resist in general, whether it be new pedagogical methods or changes in the syllabuses to include the metric system. This ability stemmed from the fact that they had lifelong tenure, and so the school became pretty much their kingdom, ruled by their will. If they opposed a particular reform, or refused to teach a

particular subject, it was hard to remove them or to make them comply. Moreover, many schools depended on the teacher to operate, since he provided the house, the furniture, and the utensils. This added to their ability to resist administrative coercion.

Santarém's district inspector reported that:

«If this district's schoolteachers were not all declared fit to lecture the metric system, it was not because they did not have time to study, nor for lack of compendiums to study from, nor absence of means of transportation to the assigned centres. His Majesty's government has provided for everything, but it cannot make active individuals out of those who have started indolently and raised to perfection in laziness, confident that, as proprietors of school tenure, they will stay in that situation forever. [...] lifelong tenure begets disdain for pupils».⁶⁰

According to inspectors, another striking feature of Portuguese schoolmasters was their old age, well over sixty. This was a purely impressionistic assessment. Nóvoa shows that, in 1875, the schoolmaster's profile was «male, lay, and young». The schoolmaster was on average aged 40 years old; 60% were under 40, and only 8% above 60.⁶¹ In the inspectors' enlightened rhetoric, old age translated into rigidity of mind and sloppiness. However, inspectors did not fail to note that schoolteachers were dramatically underpaid, which in turn reinforced the vicious circle: «his salary cannot kill the hunger that devours him and numbs his faculties». Salaries were low, and in many cases the gratuities paid by municipalities (which amounted to one-fifth of the stipend paid by the central government) were over three years overdue. Consequently, many teachers sought to increase their revenues by holding a second job. In 1875, half of the schoolmasters exercised activities other than elementary public teaching. This half was made up of priests (18%); private schoolmasters (11%); teachers of adult nightly courses (7%); public servants (7%); manual workers and shopkeepers (4%); and farmers (3%).⁶² On the whole, let me stress, 32% of public schoolmasters held a second job not connected whatsoever with teaching. The solution presented by inspectors was

to make elementary teaching more attractive to competent people. To their mind, a new generation of able teachers would rescue the children from the hands of ageing ignorant masters and priests. A raise in salaries would trigger a virtuous circle:

«Would the government establish a reasonable stipend for schoolteachers, one inviting capable people to become teachers, and then demand from them the necessary knowledge».⁶³

The enlightened rescue of «The People»

To whom were lectures addressed? Let us follow Funchal's inspector's account. Francisco Oliveira made arrangements to begin lecturing in September 1859. First, he divided the district into three centres, after careful consultation with the district's prefect and studies commissioner. Male and female schoolteachers were assigned to centres; state-employed teachers were summoned to participate, whereas private and municipal teachers were invited to attend (which they did). In spite of this, given the urgency «to diffuse instantaneously» the system, he decided to start a special course to instruct civil servants, public officials and the general public. In the city of Funchal, having received clearance from both the prefect and the military governor, he extended an invitation to employees of every public department. As a consequence, he started up a nightly course on January 19, 1860. Three days earlier, he had opened another nightly course for shopkeepers, commercial travellers, and manual workers. However, the inspector was proud of yet another course, for those who could not read, nor write, a course he described as being «completely applied». The enlargement of those to which the courses were directed was a typical process: state-employed schoolteachers, private teachers, municipal teachers, priests, «curious people», lay people, low-rank military, public officials, shopkeepers, commercial travellers, workers, and illiterate people. That is, everyone: the people.

Via the intermediation of teachers, the schooling system provided the government a long enough arm, reaching as far as to touch the population. How? The courses would enable teachers to understand the metric system...

«...so that they can later pass it on to their pupils, who, being the offspring of inferior and less intelligent classes of society, will then teach their parents and relatives».⁶⁴

«Otherwise, it is impossible to educate the people, because with their current knowledge they can hardly articulate an idea, and understand the world in order to appreciate it as it deserves».⁶⁵

The quote is paradigmatic of the representations of «the people» found in the reports and it substantiates what I designate *the enlightened rescue of the people*. The rhetoric is Janus-faced: there is, on the one hand, a paternalistic element, insofar as «the people» are described as helpless, docile, and prone to manipulation. «The people» are never the subject, but the object of power and discursive relations. Upon them bears an injunction of childishness. On the other hand, the child must come of age. «The people» are portrayed as hostages to be rescued from the forces of tradition, habit, and often faith which prevent them from growing up or maturing. Funchal's inspector tried to explain why «countryside peasants» had not attended the special course for illiterates.

«The cause for the low attendance rate lies in the bad notion that the majority of countryside inhabitants have of the system, because they are estranged from every reform and completely ignorant of the humanist principles contained therein; they believe solely in the ignorance of antagonists and routine-minded persons, and all they want to see tomorrow is what they have seen today, because the sun always comes up in the East and always sets in the West, because over here is the church tower's cross, which they have seen since birth, and over there the cemetery where they will rest for all eternity!»⁶⁶

Peasants are, therefore, cut off from the wonders of liberal reformism by a thick layer of ignorance. Not until peasants «become educated will good reforms be welcomed».⁶⁷

The *lumières* of education will emancipate people from the fetters of ignorance and tradition. Here, we can clearly listen to the distinctive tone of enlightenment and emerging pedagogical discourses. The cry in favour of public instruction was shared by nineteenth-century writers and public intellectuals. The necessary deployment of a state-led national educational system allowing all social classes free access to basic education was a central tenet of both pedagogical and political discourses. Liberal educational projects went beyond the narrow social framework of eighteenth-century reformers. It was no longer about «diffusing the *Lumières*» amidst a few privileged social groups, but rather «educating rural populations, instructing workers, enlightening the people, at large».⁶⁸ This set of ideas, of which the reports are a clear testimony, was subsequently interconnected with an emerging political outlook, characteristic of some nineteenth-century liberal ruling elites, the «modernization from above».

«It is therefore the duty of enlightened people and government to support the great work of public instruction, so that the light of modern civilization may illuminate not only major cities, but also the countryside [...] that light is the spirit's sun, as necessary for the moral and intellectual life as the sun is to physical life. Only the light of civilization can push countryside hamlets to leave a rude and almost barbaric state, embracing intimately and effortlessly good reforms».⁶⁹

The state performs an emancipatory role by educating the people, helping to upgrade peasants into citizens, able not only to «appreciate the world», but also to be part and parcel of the Liberal social contract. Herein lays the paradox: the emancipated citizen is not assigned full political rights, because he continues to be thought of as a naïve child. What is at stake in the reports is not to represent, politically, discursively or otherwise, people's will, but to mould that will into a specific shape and form, which was thought beforehand by «enlightened people», i.e., modernizing elites.

The role of the Church

In the grand design to «popularise the system», and educate the population, the Board thought it crucial to enrol yet another institutional actor, the Church. Priests ought to receive the compendiums, scale models, and conversion tables, exactly the same as schools. Also, priests should be won over to the metric cause. It did not escape the general inspector that the Church controlled a network which covered the whole territory and was comparable, if not superior, to that of the civil and military administrations, as well as a captive and gullible audience. In his words:

«The influence [priests] exert upon people's mind should be of considerable assistance to the new system. It would probably be convenient to increase the number of compendiums, so that they can distribute them gratis [...] and being the compendium useful for a fuller instruction of priests, each one of them could distribute six; this distribution, done directly by priests, will certainly yield excellent results».⁷⁰

After years of preparations, in September 1859, the General Inspection had assembled a set of useful items, containing a conversion table, a table showing the prices of new measures, a copy of the decree commanding the adoption of the metre, a copy of the metric compendium, and a copy of the metric handbook. This package was sent to the Interior, Navy, War, Finance, and Foreign Office. The set was also sent to the Ministry of Justice, which superintended ecclesiastical affairs. This was the set of artefacts whose unobstructed diffusion would help popularise the system. Again, Public Works' intentions were very clearly stated, echoing Silveira's words of August 1858:

«Bearing in mind the well known influence Priests exercise in the spirits of the people, and being most convenient to disseminate by the latter those copies, so that their knowledge may contribute as much as possible to appreciate and evaluate the advantages that will result from the adoption of the metric system, it would be of the utmost interest that every Priest should receive a complete set [...] and some more handbooks, so Priests can distribute them gratis».⁷¹

The minister of Justice acquiesced, and responded that 530 copies of the compendium would be needed to hand out to dioceses' clerics. Anticipating these would not suffice, another 10 000 copies of the handbook were requested (and actually distributed to parishes in November 1859).⁷²

The reports display an ambivalent attitude towards both Church and priests. To fully grasp it, one should recall the nature of reports as historical sources. Reports were manuscript documents sent by district inspectors to the head office. Eventually, they were published in the Public Works' official bulletin. Considering that not every report sent was printed and the importance given by the inspector-general to publicity, one concludes that every single printed report was chosen because it suited the political requirements of the reform at hand. In other words: the commentaries to be found in the reports were uttered by someone striving to promote the metric system; the publicity given to reports was expected to create a specific effect on the reader. Hence, for instance, cries against the disparity of measures from town to town were meant to expose such variance, and so generate political support for the metric reform.

Going through them, one finds two different rhetoric modes. When describing the reality found «in the field», the inspector could underline the positive, such as municipalities' efforts, or the welcoming reception by the population, and downplay difficulties, e.g., teachers' ignorance. The reported situation adheres to the Inspection's normative conceptions and expectations. This is the «what it should be like» mode, which contrasts with the «what it should not be like» mode, in which, conversely, inspectors highlight hardships, faulty organizations and resistances. These adversative realities are actively condemned. Both modes fabricate exemplary cases: examples to follow, in the former, examples to discourage, in the latter. Both are normative and prescriptive, and obviously complementary.

Funchal's inspector described his role as one of «sweeping away doubts left in the spirit of less enlightened people». In so doing, he received considerable help from Madeira's clergy, «a truly illustrated clergy, without the fanaticism, nor the hypocrisy of monks». Madeira's bishop was up to date with the efforts of Piedmontese clergy to help diffuse the knowledge of the system. Priests taught the system in every catholic school in the archipelago. The bishop used his persuasive powers with other clerics, especially those who were also elementary schoolteachers. Clerics attended courses side by side with their lay colleagues. If Madeira's clergy, «after comforting their listeners' hearts with the beneficial and balsamic words of the gospel, go and disseminate instruction, teaching the children in their parishes [...] feeding them with the bread of education», probably it would not be inadequate to speak of a *metric gospel*.⁷³ Conversely, whenever the purpose was to denounce clerical lack of co-operation, reports voiced an audible anticlerical tone. It is hard to tell if displays of anticlericalism stemmed from inspectors' idiosyncrasies or were merely a rhetorical device. The illustration comes from the district of Leiria, where of the 52 schoolteachers who attended courses, 17 had botched the final examination. Why?

«Some due to accidental illness [...] others due to lack of diligence; and finally some due to the most complete inanity, including amongst the latter two priests, to whom is assigned the spiritual well-being of their flock. [...] attendance was very low, especially in the district's capital, where I had only two voluntary listeners, notwithstanding the fact that I was given by the studies commissioner and the director of the district's National High school one of the best classrooms in the building, inside which twenty five young men train to be priests, not even one of them attended my lectures».⁷⁴

Are schoolmasters teaching the metric system?

In January 1863, 1 414 individuals had received instruction and passed the metric examination, of which 1 129 were elementary teachers, and 285 private citizens and

public officials who had voluntarily attended classes.⁷⁵ However, such hard work would amount to little if schoolmasters would not teach the system in their classes. This, in turn, depended on the Interior's elementary school policy. In June 1859, the inspector general did not hesitate to advise the teaching of the metric system be made mandatory, as he had «asked for a thousand times».⁷⁶ Indeed, this had been a long-standing request: in 1856, the Board had voiced the need for the metric system to be required teaching in schools; the Interior responded it would be dealt with «in due time».⁷⁷ Again and again, Public Works asked the Interior to order that the teaching of the metric system, at least, be included in the elementary syllabus, or, better yet, be made compulsory.⁷⁸

Within a year, a doubt grew in the mind of the inspector general: what if, after all the toil, schoolteachers were not teaching the metre? There were several sources hinting at this. Coimbra's inspector, for example, explained: «it is not enough to start courses one after the other which can be left vacant». More was needed: pay schoolmasters gratuities so they would feel the incentive to give public courses; start new courses in every district capital; require metric literacy for every job which formerly required the knowledge of how to read, write and count; finally, inspect whether schoolteachers actually taught the metric system as they were endlessly instructed to.⁷⁹ Porto's inspector called for a direct inspection to schools.⁸⁰ Another important source was a letter sent to the Department's head by a zealous schoolteacher. The letter was then forwarded, with some alarm, to the minister.

«Famalicão's elementary schoolteacher addressed my department to report that in almost every rural parish, and even in villages and towns, there are a great number of unskilled elementary schoolteachers who try, and attain, to divert pupils away from public schools, employing every conceivable means to bring down public professorship. Amongst such means, one of the most efficient is the exploitation of people's good faith and prejudice, to whom is said the new measuring system is harmful and vexing. From these innuendos results the discredit of official schools, [...]. This letter acknowledges facts that occurred in a single district, but this

Department is aware of facts taking place in all Districts, and the information I must give Your Excellency on this matter cannot be but the full corroboration of the above said. Therefore, it is necessary to take action against the charlatans who seek to play with people's passions and ignorance; once this is done, once extinguished the cause for public schooling not being as it should be, it is urgent to rigorously inspect public schools, and force teachers to perform their duty».⁸¹

As one can see, the problem was not circumscribed to public schools. In fact, the inspector general bitterly complained that in private elementary schools, financed by public monies, pupils were taught either the old system exclusively, or both. He calls for action once more: the new system should be taught in exclusive, and masters refusing to abide by this precept should be penalised.⁸²

The institutional pressure put on the Interior/General Department of Public Instruction (GDPI) by both Department of Weights and Measures (DWM) and Public Works moved along three thresholds. First, stressing the need to distribute to every school conversion tables, models, scales, and copies of the compendium. Though the handing out of models lagged behind, by November 1858 the Inspection had sent 1 494 copies of the compendium (one for every teacher), and commanded the printing of 80 000 copies of the handbook (elementary school population estimated to be 74 700), of which some 56 000 were also distributed in November 1858. Second, insisting that the teaching of the metric system ought to be made compulsory. This brought about a flood of exchanges, from 1856 to 1859, leading the Interior to reply in September 1859 that it had already given schoolteachers specific orders to that effect. Thirdly, insisting that the knowledge of the metric system ought to become obligatory for all those applying for elementary school tenure.

Eventually, in response to a siege of reports, Public Works commanded a full inspection to public and private elementary schools to find out whether schoolmasters were lecturing the system.⁸³ The inspection would be carried out by Department

officials and district inspectors. Officials were to write reports on their findings, and subsequently send them to the head office.⁸⁴ On 9-11-1861, Interior was informed of this decision, and was asked for co-operation, replying with the circular letter 28-11-1861 addressed to district studies commissioner. Commissioners were instructed to give appropriate orders to the effect that neither public nor private elementary teachers would oppose the «least hindrance»; on the contrary, they should provide inspectors with every required piece of information.⁸⁵ This inspection took the better part of 1862, and was concluded in September. 2 444 schools were inspected, of which 1 418 public and 1 026 private.⁸⁶ As we can learn from the table, by the end of 1862, the inspection had covered only 80% of public elementary schools.

Number of public elementary schools created per year

1855-1862

	Until 31.12.1854	In 1855	In 1856	In 1857	In 1858	In 1859	In 1860	In 1861	In 1862
Male	1146	75	73	64	48	53	26	57	55
Female	53	16	18	14	21	18	10	22	17
Year total		91	91	78	69	71	36	79	72
Accumulated T	1199	1299	1381	1459	1528	1599	1635	1714	1786

Source: *Diário de Lisboa*, 9-2-1867.

It is unfortunate that the archival documentation detailing this inspection is lost (15 manuscript volumes, sent by the DWM to the Statistics Department in September 1862).⁸⁷ Nevertheless, it is possible to grasp the overall results by drawing on two interrelated sources: a couple of Interior ordinances, dated 30-9-1862, and a circular letter dated 10-10-1862, sent by the GDPI to district commissioners, detailing the ordinances' contents, and offering commissioners guidelines on how to enforce them. In one of the ordinances, one learns: «the inspection lately carried out in private schools found that the metric system is not being taught in the majority of them»; the other

recognized that «the data lately brought to the government's attention, shows that some schoolmasters do not teach the metric system».⁸⁸ The circular letter expands on these remarks: «Some schoolteachers did not teach the new legal system of weights and measures because they were not privy with it; others, due to negligence and carelessness; finally, some fanatics of the authority of tradition stubbornly insisted on countering the reform».⁸⁹

These ordinances were preceded by two official letters sent to the MI/GDPI by the MPW/DWM. One of them acknowledges the metric system was not being taught in private schools, presenting this as an objective finding of the 1862 inspection.⁹⁰ The other consists of a report on Leiria's elementary schools sent by the district inspector.⁹¹ That was the drop too many. The combined pressure of years of official letters and the findings of the 1862 inspection finally pushed Interior to address two long standing requests: sanctions for disobedient teachers and the requirement of knowledge of the metric system in applying for elementary school tenure. For a certificate exam, commissioners ought to make sure that examiners would thoroughly test the «capacity and proficiency» of candidates on the metric system, excluding those who could not obtain passing grades.⁹²

Such a clear position, on the one hand, retrospectively legitimised complaints on the lack of co-operation from teachers, and from Interior itself, and the need to be more coercive in order to obtain palpable results; on the other hand, it definitely established inspections as the favoured administrative procedure to yield compliance. Both suggest a shift from a philosophy of enforcement based on enrolment of heterogeneous actors, and on a intermediate relationship, to one based on a more direct and coercive relation, assessing the ability to obey legal norms and unambiguously punishing disobedience, via disciplinary charges and penal sanctions. These were not zero-sum approaches, but

stages in a somewhat continuous spectrum. That much was explained by the minister of Public Works to studies commissioners in October 1862: only after «soft methods are exhausted, should commissioners resort to harshness».⁹³

Following-up on the priority assigned to inspective procedures, Interior ordered (23-7-1863) a second general inspection to elementary schools. The questionnaire had four main topics – school material and facilities, schoolteachers, students, subjects taught – and included a couple of questions on the metric system: the first inquired whether the school had charts and scale models of the system; the second inquired whether the system was being taught, and, if so, with which results. There are thousands of manuscript returns in the archive of the MI/GDPI.⁹⁴ Luckily, the results were published in the official gazette between May 1866 and January 1867. The results are organized by district; the information sorted by municipality. There is no information on individual schools, and the original questions were abridged. The original answers were standardized to fit in certain categories.

The table shows that over a year after the teaching of the metric system had been made compulsory almost half of the students presented insufficient knowledge of the system, probably, one suspects, because the system was not being taught at all. Moreover, in the districts with the largest student populations (over 4 000 pupils each, both sexes combined) one finds some of the highest «insufficient» percentages (Braga, 55%; Coimbra, 34%; Lisbon, 54%; Porto, 31%; Vila Real, 29%; and Viseu, 56%). These findings support the idea that to inspect and apply penalties would not suffice unless every newly appointed teacher was compelled to be knowledgeable of the system. A caveat is in order, though. In 1854 there were 1 199 public elementary schools; in 1866, there were 2 123.⁹⁵

«Schools in which the teaching of the metric system was found to be...»

District	# Schools inspected	«Sufficient»	%	«Insufficient»	%
Aveiro	87	54	62,1	33	37,9
Beja	49	25	51,0	24	49,0
Braga	94	42	44,7	52	55,3
Bragança	53	35	66,0	18	34,0
Castelo Branco	58	17	29,3	41	70,7
Coimbra	90	59	65,6	31	34,4
Évora	37	21	56,8	16	43,2
Faro	47	40	85,1	7	14,9
Guarda	148	62	41,9	86	58,1
Leiria	68	52	76,5	16	23,5
Lisbon	123	56	45,5	67	54,5
Portalegre	55	33	60,0	22	40,0
Porto	54	37	68,5	17	31,5
Santarém	73	46	63,0	27	37,0
Viana do Castelo	47	31	66,0	16	34,0
Vila Real	82	58	70,7	24	29,3
Viseu	182	80	44,0	102	56,0
Angra	20	10	50,0	10	50,0
Horta	8	7	87,5	1	12,5
Ponta Delgada	21	17	81,0	4	19,0
Funchal	20	12	60,0	8	40,0
Total	1416	794	56,1	622	43,9

Source: «Estatística das escolas de instrução primaria, segundo os dados da inspecção de 1863-1864», *Diário de Lisboa*, 1866-1867.

In October 1866, the Interior addressed the issue of elementary school inspections. The government felt it could build upon recent experience, and try to definitely set a permanent inspective body. In fact, the annual budget had specified 6 *contos* for elementary school inspection. There were three factors at work here: «This amount of money, after earlier experiments and works, shows that a regular inspection properly organized is a branch one should assume to be demanded by general opinion and accepted by public powers». That is, when money, political will, and public legitimacy

were combined, «nothing is amiss to make such a service enter the order of ordinary institutions», i.e., the moment was ripe to create inspective procedures. «The inspectorate», thus, «can, in fact, be considered a public service accepted by the country».⁹⁶

This ordinance clarifies the major symbolical and political relations between the desired societal archetype, the appointed role of the school system in the (re)production of society at large, and the inspectorate's worth as the most adequate administrative technology to implement policies and enforce the law, both by assisting its juridical enforcement and by performing a sort of «metonymical enforcement» of the legal text. Because they are «social duties», the state cannot be indifferent to instruction and public education. The state «must seek with discretion the balance of society's forces». Which forces? «If instruction and education acquire an exclusivist character, and follow one single inclination, the state will admit to alienating itself from the better part of the social action».⁹⁷ Given the crucial role of the school in balancing «society's forces», that is, the school's pivotal role in the reproduction of society, whoever controls the school will be able to steer certain key societal processes.⁹⁸ What *single inclination* was the government alluding to? The government was alluding quite clearly to the Catholic Church, the only institution who could, and did, compete with the state in the schooling market and in the capacity to mould society at large. Moreover, the 1860's were the moment in which the anticlerical element in the Liberal Revolution manifested itself quite virulently in the political public sphere. The ongoing scandal concerning the French «Sisters of Charity» had stirred public opinion, caused governments to resign and, generally speaking, created the context for the clash of equally strident anticlerical and conservative positions. In the words of a Portuguese historian, this period can be

appropriately termed the fountainhead of the «republicanization of Liberal Monarchy».⁹⁹

According to the ordinance, there were important reasons to promote public education: the practical consequences of learned knowledge, the fact that education would provide individuals with «varied skills» suited for «every professional career», and that to educate was a duty, a «duty to prepare good citizens ready to participate freely with their own available resources». Participate in what?

«The scion of the nation is in the school, because the school is where the education which prepares one for social life and the moral and religious education which moulds the customs of citizens is located».¹⁰⁰

Elementary schools should assist in the «production» of a new and specific type of citizenship. Politically, by way of linking the individual to the collective, they would assist a faint modernisation from above that slightly promoted achievement over ascription. Elementary schooling was one of the first waves of emancipative citizenship eroding the shores of tradition and custom. No longer a backward *Ancien Régime* peasant, the citizen should be able to participate; emancipated to a certain degree, he could now occupy his role as spoke in the wheel of the liberal social contract. Finally, on the importance of inspection procedures:

«The inspection is the most important means by which the state can and ought to exercise a beneficial action in the vast endeavour of the social function of education, in which anyone is allowed to be a priest to evangelise, to well educate and instruct, but not to be the instrument of destruction [...] To extract from education every outcome that it should yield, it is not enough to create the school and provide it with schoolmaster and students. [§] It happens with elementary instruction the same as with all social forces: it can be an instrument of life or an instrument of death, depending on whether it is rightfully or wrongly aimed. It is absolutely necessary that the state, through inspections, assures the intelligent execution of laws, and the maintenance and employment of good methods, then to

be disseminated everywhere; only in this way will the state be able to eradicate evil, and to plant good». ¹⁰¹

The quote gradually moves from a concept of education and inspection as modernising instruments in the service of the state, the law, and society to a concept of education and inspection as weapons in the fight between good and evil, on the side of life against death. When I spoke earlier of «metonymical enforcement» I meant the capacity of inspections to enforce the dividing line between a lively, modern, well-managed and ultimately good society, and a dull, backward, manipulative-prone and ultimately evil society. One cannot fail to note the overt religious tone: the educational function, in which anyone can be «a priest» and evangelise, educate and instruct, contributes to emancipate the individual, preparing him for the life in heavenly Liberal society. ¹⁰²

The metre and the kilogram are enforced

Legal framework

The government anticipated the need to set different deadlines for enforcing different standards. The main concern was technical and political. The more an old standard was homogeneous across the country, the easier would be to enforce the new metric one and the earlier could the deadline be set. Such was the case of linear measures. The introduction of the metre was made easier because the length of the *vara* was approximately the same across the country and because both lengths were, to everyday uses, fairly akin (1:1.1). The more resistance was anticipated to the introduction of a specific standard, the later the deadline would be set. The anticipated level of resistance was a function of the level of heterogeneity of the standard across the country and the degree of dissimilarity between old and new standards. Thus, the kilogram was

enforced later than the metre. For similar reasons, the litre, contrariwise to the 1852 provisos, was enforced much later.

The first reference to enforcement deadlines dates from November 1855. The Board, «having in mind the need to proceed cautiously [...] believes the system should start to have execution in the first semester of 1856, but only in what concerns linear and weight measures, leaving capacity measures for the second semester, or even a little later if need be».¹⁰³ This optimistic stance was revised in June 1856. Addressing the new prime-minister, the Duke of Loulé, Silveira set the date to enforce the metre and the kilogram to 31-1-1857 in mainland, and 1-3-1857 in the islands as a provision necessary for the «prompt establishment» of the system.¹⁰⁴ The new cabinet agreed with the Board that linear and weight standards should be enforced before capacity ones.¹⁰⁵ A little later, July 9, Silveira says that it would be impossible to follow these dates, which makes one suspect he was only using the deadline argument to push the government to formally create the General Inspection.¹⁰⁶ During 1857 and 1858 there was little talk of new deadlines. 1857 was the year of despair, because the government could not make up its mind to create the long-desired General Inspection; on the contrary, 1858 was the year the Inspection was finally set up, and a year devoted to comparisons. At last, in June 1859, talk about deadlines resumed in two official letters, in which Silveira demonstrated that everything was ready (conversion tables were published and standards were being distributed to municipalities), suggesting as deadlines the beginning of January and March 1860.¹⁰⁷

The metre was formally enforced by the decree 20-6-1859, which set 1-1-1860 (Lisbon municipality) and 1-3-1860 (rest of the country) as dates from which old measures were definitely abolished and new measures legally enforced, that is, with application of penalties for all forms of disobedience. Likewise, the decree 20-9-1860

formally enforced the kilogram from 1-7-1861 onwards. As for volume and capacity measures – the litre –, but also surface measures (the *are*), their enforcement took place much later on, well past the ten-year deadline set in 1852. The government was the first to reckon with the fact that it was not complying with the law by way of legalizing the breach, in May 1867: the deadline for the whole system was prorogued to the first of January, 1870.¹⁰⁸ In August 1867, the government decreed the enforcement of capacity and surface standards from October 1st, 1868 onwards.¹⁰⁹ In May 1868, it decided to send to the municipalities the sets of cylindrical standards to be exhibited, so that «private industry» would use them as «working models of the standards to fabricate».¹¹⁰ Such optimism did not last long. In September 1868, the newly-appointed Sá da Bandeira cabinet postponed the deadline for volume and capacity measures to May 1, 1869, in every municipality except Lisbon and Porto (to which the 1-10-1868 deadline still applied).¹¹¹ It happened, however, that the gauging of new standards, required by law, was running awfully late for the good and simple reason that their manufacture was dragging to a halt. Thusly, and considering the proximity of the mandatory deadline, «the immediate application of fines and penalties would be vexing to people making use of abolished standards for lack of new ones».¹¹²

This was just the first in a succession of deferments of the deadline. Invoking the same reasons, the decree 24-4-1869 pushed the deadline forward in every municipality, except Lisbon and Porto, to 1-1-1870.¹¹³ Some months later, the new Loulé cabinet, by decree 27-11-1869, astoundingly invoking the same 1868 arguments, and for the third time, postponed the deadline for the use of the litre, in every municipality, with the exception of Lisbon and Porto, to 1-1-1871.¹¹⁴ The government was clearly loosing its grip. So much so it was compelled to legalize, decreeing it to be mandatory, the gauging of old capacity standards, since the new were not yet in use,

outside of Lisbon and Porto.¹¹⁵ This latter piece of information was denied by the proposed bill of 7-12-1870, collected in the *Legislação e disposições regulamentares sobre o serviço de pesos e Medidas*¹¹⁶, which postponed the deadline, in Lisbon and Porto, to 1-7-1871 (thus indicating the new measures were not yet legally enforced); and in the remaining municipalities to 1-1-1872. Finally, the law 8-2-1871 postponed for the fourth time the deadline for compulsory use in every municipality, except Lisbon and Porto, to 1-1-1872.¹¹⁷ It is solely due to the absence of another prorogation in the legal collections I researched that I conclude that the litre finally knew legal enforcement in 1872.

The resistible metric system

Popular resistance

Lisbon

Late June 1861. Within a few days, on the first of July, the kilogram would start to be enforced as the legal weight standard. On June 19, the daily *A Revolução de Setembro*, the opposition newspaper to Loulé's centre-left government, published a short note criticizing the government for failing to prepare the currency for the upcoming reform. Simply, there were not enough change coins, and coins small enough, to give change to customers buying bread.¹¹⁸ On 21-6-1861, the Lisbon prefect wrote the Interior informing that shopkeepers did not want to use new weights and were threatening to close shop.¹¹⁹ The next day, Public Works asked the Interior that municipal administrators always employ persuasive methods so that the reform can be successful.¹²⁰ In response, Interior sent a circular letter to prefects and to several institutions dependent from it, urging them to abide by the decrees of 13-12-1852 and

20-9-1860.¹²¹ On the due day, problems mushroomed in bakeries all over the capital.

The *Revolução* reported:

«It was due today to begin selling all commodities by the weights of the metric decimal system, and we were told everything was prepared. Tonight, however, the government sent warning by the police that everybody is allowed to buy and sell as it wishes, and using the weight it wishes. [§] There was not a single person who did not lament such imbecility and impotence. This government shames us. [§] What do they want to do now? Whichever reasons might have been there today will always be present, and from now on no one will respect those who were not able to earn respect. When you give in to such weaknesses, at least you have the courage to resign office in order not to denigrate authority and national dignity».

«Sources in the police tell us that yesterday around nine in the evening there was a big gathering of people in front of a major bakery manufacture in the *Rua da Mouraria*, because the baker was selling bread by new weights. A couple of soldiers from the garrison were sent and found the bakery already closed».¹²²

The administrative chain of command had already briefed the Interior. That same day, the Lisbon prefect forwarded to his minister official reports from neighbourhood administrators detailing events and spelling out the story of generalised riots which took over the city on the night of July 1st. The prefect had just ordered neighbourhood administrators to «refrain from inspection, replacing it by persuasive means, and act with all necessary prudence to avoid all sorts of conflicts that might alter public quietness and tranquillity».¹²³

The *Revolução* charged again, a couple of days later. The article, considering that the metric law had been followed almost only by public departments, attacks ferociously the minister of the Interior and prime minister. According to the paper, the government had ordered the police to tell bakers, shopkeepers, and bulk sellers in general that they could sell as they wished. This was an act «more of silliness than immorality». In the portrait of the government, this act prefigured «a system of generalised fraud».

On Saturday, bakers had sold their clients enough bread for Saturday and Sunday, saying Monday the bread would be up five *réis* and slightly larger. But then came the official warning and everything crumbled. «Confess you do not know how to govern; admit you spoil every useful thing, and that you are imbeciles. Who on earth gave the government the right to advise the transgression of the law?»¹²⁴

On July 10, the Interior sent a circular letter to all prefects asking for reports on how both metre and kilogram were being received by the population and what kind of difficulties they faced. The massive reply, hundreds of official letters from municipal administrators, constitutes one of richest and most interesting sources on the issue of metric implementation.¹²⁵

Porto

The Porto-based daily newspaper *O Comércio do Porto* reported that word went out in the city the metric system would not be enforced, and the gauging stopped almost immediately. The prefect, the inspector of weights and measures and the president of the municipality held a meeting with the merchants. The authorities sought to convince them that the law had to be abided by, asking for their help since they were the «ones most in contact with all kinds of consumers». If they would comply, that would be crucial. Merchants' representatives declared they would adopt the system only if Porto's Commercial Association did the same, as well as butcheries from nearby villages and hamlets. The paper lamented this «lack of deference towards authority».¹²⁶ The *Revolução* snorted: «and that is that, because the superior authority in the district does not have the necessary strength to enforce the law».¹²⁷

The *Revolução*, quoting the *Comércio*, informed that on July 25, the five biggest butchers in Porto were summoned to the town hall and asked to start using new weights. They replied they could not promise anything without consulting with their colleagues.

A new meeting was set to the 30th. The butchers met on the 29th and decided that the president of their *Grémio* was to attend the meeting the next day and declare all 345 butchers in the city «ready to abide by the law». However, «since the law applied to everyone it should start being put into practice by wholesale traders». The president of the *Grémio* duly attended the meeting, and gave notice of their deliberation, and of the impossibility of starting to use new weights whilst they were not in use in nearby municipalities. Not until new weights ceased to be «repugnant to people» would they adopt them. In the nearby municipalities of Gondomar and Bouças, the people had been showing strident dislike for the kilogram.¹²⁸

The *Comércio do Porto* took the side of the kilo. Mid-July, the topic merited an editorial:

«We are persuaded that the general repugnance the public has been displaying towards the new weights and measures, has no reason other than the lack of knowledge and intelligence of the metric system. [§] Our people are docile and respectful of the law [...]. [§] The more enlightened people of the commercial class, recognizing the difficulties of transition, pay, however, due honours to its superiority over the unlawful and variable system lately abhorred. [...] [§] However, it is exactly because we think it to be good and wish it to be established in our country and generally adopted, that we recommend and advise all moderation on the part of the authorities charged with supervising its execution. [§] The people do not easily change their usages, even if to their advantage, and only with time can certain reforms be done. [§] We trust, therefore, in time and in the prudent action of the government. The law that put the metric system into force must not be revoked, because it is one of the improvements we leave to our children, though with our own sacrifice. [§] The more enlightened the classes that have to use the metric system will be, the easier it will be for them to understand the system. It is the duty, therefore, of wholesale traders, of the tobacco contract and of public departments to adopt it immediately, and all classes dependent on these will find themselves in need of adopting it, without resorting to the rigour of the law».¹²⁹

The prefect issued a special bulletin to all municipalities reminding them of the need to abide by decree 20-9-1860, and another one some three weeks later.¹³⁰ It was not enough. The prefect explained to the minister that «abhorrence» was enormous, difficulties huge, and great the need of prudence. Merchants and butchers had put up the fiercest resistance; they had been impossible to persuade. Their repugnance sprang from the lack of small coins for change and the fact that the competition in neighbouring Vila Nova de Gaia was selling cheaper meat by old weights. Butchers said they would comply only when the law began to be enforced both in the city and neighbouring municipalities. He informs that it «would not be timely to use rigorous means of enforcement in the moment when the Municipality had just announced to inhabitants His Majesty's visit [to the Porto Industrial Exhibition, October 1861] [...] thus it is wise to postpone the use of rigorous measures».¹³¹ December, 14, the minister, in the face of continuing abuses and disrespect of the law, issued a ministerial ordinance charging Fradesso himself¹³² to go to «the districts of Porto, Braga and Viana, employ all the means deemed necessary to bring about effective compliance with the law of 20-9-1861».¹³³ Which he did.

Almodôvar

According to an official letter from the district's department of public works, on 1-9-1861 a popular uprising against the new weights took place in Almodôvar.¹³⁴ As reported by the president of the municipal council:

«Yesterday, from seven to eight in the morning, several weights of the new legal system were distributed by fruit hawkers [...]. It came to my knowledge that Carlos Pina and his wife were selling by the old weights in contempt of the law, I ordered the municipal bailiff to apprehend their unlawful weights [...]. The mass of the people started to cry out loud = all together, all together set on fire, on fire = and then these voices forced fruit vendors not to sell anymore by the weights of the new legal system but rather by those of the old system, returning new

standards to the town hall: the same cries were then repeated and the throng of people, now in greater numbers, headed to the residence of the meat wholesaler [...] to hand over to him the key of the municipal butchery, and with the key they brought the weights of the new system, and did the same with those of the fish market, returning them in the same way. Today, from seven to eight in the morning, flocks of commoners started pouring in the streets around the municipal butchery (which remains closed) crying for the selling of meat by old weights, when all of a sudden one of the groups decided to go to the town hall and request old weights be given back to them, which they effectively took to the butchery».¹³⁵

The head of the Beja public works department then wrote the DWM giving an account of the same incident. Leaving factual details for the enclosed official letter from the president of the municipality, he chose to focus on the interpretation:

«The uprising of the populace is the result of the aversion people show towards the system of weights, and it springs by and large, in my opinion, from ignorance hence inability to employ them in the ordinary uses of domestic life. This circumstance is to be found in every hamlet, and for each hamlet there is a smaller or bigger probability of such riots happening. Another circumstance that has contributed a lot to making the weight system detestable is the abuses perpetrated by traders, who profit from buyers' ignorance to do fraudulent weighing and demand higher prices than those corresponding to the quantities of goods being sold. [...] In most municipalities in this district, the use of new weights has been very limited; one can say that that use is limited to butcheries and fish markets, for depending directly from municipalities. In private shops and stores either one does not use new weights at all, or one uses them at the same with the old ones, [...]. The municipalities closest to Beja look at the city's behaviour in search of example. The thing is that here, with the exception of the butcher and the fish market, very few stores use new weights, the same happens in nearby hamlets. In order to promote the use of the new system, I have asked several times for the intervention of the higher administrative authority of the district and of the *Comarca*, but to no avail. The administrative authority believes it would be imprudent to deploy the means that might bring about the desired outcome, in order not to aggravate the delicate situation of the implementation of the new tributary system, and for that reason no decisive measure has been taken, fearing perhaps any popular agitation».¹³⁶

The official explains he had already proposed the municipality a number of times that a meeting be held with the biggest merchants in town in order to «convince» them of the «convenience and obligation of using new weights».¹³⁷

Setúbal

The case of popular resistance I find most interesting is the so-called «Setúbal uprising» of August 12, 1861. Setúbal was a medium-sized port city, located at the mouth of the river Sado, 60 km south of Lisbon. Fisheries and salt-mining employed the better part of the population. Let me present an account of the events based on the *Revolução*'s piece, entitled «Riots in Setúbal».¹³⁸ It all began with a row among salt workers, between those who pick up the salt from the tiny lagoons and those who carry the salt on their backs in large baskets. The quarrel had to do with setting a workday's pay. After the intervention of the controllers on behalf of the bosses, the controversy seemed to have been settled. Not so. The moment workers were getting back to lagoons, «a large assembly of people from Azeitão hollered: - *Do not return to the old ways!* – And immediately workers started tearing down baskets and other objects carried by the other workers, threatening to spank them if they continued on route to the lagoons». The account goes on: the mutineers screamed they ought to set the house of the author of the new price on fire, «but then the mutiny calmed down a bit; However, mutineers decided that the new weights should be thrown into the sea, since the price of the bread was up 5 *réis*, not realizing that they got a bigger portion with the new price». Upon arriving at the site, the administrator was welcomed with insults.

«After that, the masses split into smaller flocks and began going into every shop, pulling down weights and throwing them into the sea and into the wells. Doing these deeds, one saw bands of ten to fifteen or sixteen year-old boys, led by one or two men. It was to everybody's wonder and indignation that this sad spectacle was performed by a few groups of youngsters insulting a town of eighteen thousand

souls, and in plain sight of thirty bayonets witnessing this shameful scene in orderly formation. [§] There was not a single police corporal within sight, nor, to our knowledge, was their coming asked for, nor customs guards, nor tobacco contract officers, in order to, together with the troops and willing people, keep the public order and give respect to the authority that was mocked and swindled by some turbulent men and – by many boys and hundreds of children, some of them barely able to carry the kilogram they were going to throw into the sea. [§] We were told that the administrative authority, fearing more misdeeds or in order to prevent the mutineers from doing even worse, had told them to take only the new weights [...]. [§] By noon everything was finished, as there were no more weights to throw into the sea [...]. [§] By six o'clock in the afternoon, a detachment of some sixty bayonets from Infantry 7 arrived at Setúbal, then marched to the barracks preceded by a great many number of boys, the ones who had taken and thrown the weights into the sea, only now were giving cheers! It was a day of joy for youngsters. [§] Today, by six o'clock in the morning, the Prefect arrived in Setúbal [...], accompanied by 24 horses of Lanceiros 2, having stayed behind in Barreiro still some 40 horses of the same corps. Setúbal was in the most absolute quiet and the population somewhat ashamed of having suffered the slur we have just narrated». ¹³⁹

The news officially hit Public Works on August 17, when the letters exchanged between Setúbal's administrator, the prefect and the district head of public works arrived at Lisbon describing «the manner by which, on the 12th, several shopkeepers of Setúbal were violently deprived of their weights». ¹⁴⁰

Institutional resistance

Nomenclature

Most municipal administrators deemed the Greek-Latin names to be the major obstacle to overcome. ¹⁴¹ In Mangualde, the administrator reported: «The uniformity of weights and measures is generally welcomed by everybody: the terminology, however, is disliked entirely by the majority of people». ¹⁴² According to the report from Pesqueira, «the best, sole and most reasonable means to pave the way for this innovation is not to make an issue of the names, in the beginning, nor compel people with legal violence to

make them say metre or *vara*, or *arratel* or half a kilo». To him, in France the system had faced fewer obstacles, not just because it was decreed in times of revolution but because of the restlessness of the people. But even restlessness had been defeated by time. In Portugal, where «the nature of the people is gentle and peaceful, everything will fall into place in due time, since this is one of the cases in which time will do more, and will overcome more than the law». ¹⁴³

Metre yes, kilo no

An interesting finding was the differential success of the metre and the kilogram. Reportedly, in S. Pedro do Sul, the population already used the metre to buy and sell, whereas they continued to order by the *arratél*. ¹⁴⁴ In Mangualde, shopkeepers said clients kept ordering by the *côvado*: «shopkeepers excuse themselves by saying if they do not do that, they will not sell and that in the big cities it is the same». Concerning weights proper, nothing happened. ¹⁴⁵ In the district of Braga, rather conservative and catholic, linear measures had been widely accepted and «despite the majority of the people not understanding them, and thus not liking them, vendors keep using them». Weight measures faced resistance, especially in «a district such as this, in which there is a forceful opposition towards everything which is progress». ¹⁴⁶ The relative ease for the metre and unease for the kilo was likewise reported in the districts of Bragança, Castelo Branco, Guarda, Leiria, Porto, Viana do Castelo, Vila Real, and Viséu. ¹⁴⁷

The domino reaction

Reports from administrators and prefects arriving at the Interior in the later half of 1861 also show evidence of what I call the domino effect: the consequences of the fact that Lisbon and Porto failed, or were perceived as failing, to observe the law. This

perception was almost immediately turned into an excuse by distant municipalities, retailers and bulk traders.

In Mangualde, the administrator reported: «[repugnance] was worsened by the news coming from Lisbon and other important localities that the system had not been enforced from the 1st of July».¹⁴⁸ Such news always triggered energetic denials by public authorities. The sheer amount of denials that enforcement of the law had been postponed is a good indication of how widespread the rumour was.

In the district of Aveiro – the prefect reported – all shops, butcheries and bakeries had begun to use new weights with no signs of resistance. However, in the following days, the rumour spread that in the capital the use of old measures was tolerated and the procedure duly authorized, which caused several shops to go back to old measures. Moreover, groceries were supplied with merchandise coming from Porto that was referred to old measures, and «the example of Porto, together with difficulties found in calculating conversions, are the causes explaining breaches of the law».¹⁴⁹ The same in Viseu where, after a decisive meeting between municipality, officials of local DWM and traders, it had been agreed to use new weights. However, wholesale traders in Porto still shipped merchandise referred to old weights and «instigated their delegates in [Viseu] not to acquire new weights».¹⁵⁰ In Beja, some shopkeepers who had bought new weights decided not to use them and keep with the old after reading in the *Revolução de Setembro* that the government had authorized that procedure.¹⁵¹

The force of habit and the need to change normality

One of the most striking features emerging from Interior's sources is the extent to which administrative officials perceived the problem of implementation from the point

of view of the need to change the normal, as well as the normative. The municipal administrator of Tondela, for instance, reported that:

«[The biggest encumbrance] is the repugnance both of seller and buyer; the former, because the commoner does not in any way subject himself to the new nomenclature; he is unable even to pronounce it because does not understand, thence fears being deceived; the latter, because many do not understand the new system, therefore are not able to execute the necessary calculus, and others, even if understanding it, knowing that in the major cities of the kingdom the system is not yet being enforced, also follow this example; besides, both do not want to abide by the obligation to buy new weights, saying they still have the old [...]. [The implementation of the system] will be encumbered, not only in this municipality but across the kingdom; I am not saying that it will never grow roots, just not all of a sudden, and only amidst merchants, because with the rustic people it will be very difficult, as people are very suspicious and afraid of being conned, and also because of sheer ignorance and lack of understanding ».¹⁵²

The unfolding of this process is inextricably tied with that of the formation of images of the people, which emerge always within a political context. The source of political legitimacy now dwells in the people. The fear that adversaries might easily manipulate a child-like citizenry into political opposition is always present.

«The new system of weights and measures is [...] welcomed by the thinking class of Society; however, for the people immobilised in the ways of progress, or instigated by someone who seeks to use this medium of opposition as a political weapon, has presented traces of reaction».¹⁵³

If one recalls, Fradesso had stressed elementary schooling as a decisive element in the enforcement circuit. Let us see how a prefect assessed the ability of commoners to be taught in riot-prone Viana:

«Only time and continued utilization will bring about familiarity and comprehension of the new system by commoners. Explanation or theoretical instruction is of little interest for them. [...] The lag in civilization of vendors and buyers, if it cannot work as justification, at least will work as an excuse».¹⁵⁴

Defining authorities as the culprits

Fradesso da Silveira and Public Works increasingly blamed municipalities and administrative authorities for the reform's failure. Fradesso singled out the lack of «bureaucratic modernity» as *the* major obstacle, whereas he portrayed people as «docile and obedient». Conversely, Interior, which supervised the peripheral administration and oversaw municipalities, resorted to another interpretation. While recognizing that some municipalities were unforthcoming to the reform and some prefects were sloppy at least, it pointed to the people, their ignorance, backwardness and gullibility, as major hindrance.

In September 1861, fifteen months before the overall deadline, Fradesso addressed a lengthy report to his minister. He divided the reform at hand into two different parts: the inspectorate and the replacement of the old system. «In Portugal – he wrote – the inspective service was in the utmost disarray».¹⁵⁵ He states that, in spite of having the law on their side, municipalities have overlooked the service, either out of sheer incompetence, for unlawful reasons, or from lack of resources to pay gaugers. He cries against «abuses, against the sloppiness in most municipalities of the kingdom, against the tolerated, if not promoted, offences, against the organized and protected reaction by those who should help us».¹⁵⁶

From the Department's viewpoint, the problem was not only elected municipal officials, but also prefects and municipal administrators under the tutelage of Interior. They should «help» the Department; instead, they displayed a remarkable «lack of energy». Authorities, «forgetting the Administrative Code», did not exert the required inspection.¹⁵⁷ «Thus, those who respect government's orders are punished, and those who despise them are rewarded».¹⁵⁸ Public Works issued an ordinance to Guarda and Castelo Branco prefects ordering them to issue decisive orders to administrators to

abide by the 20-9-1860-bill.¹⁵⁹ This was an established pattern. Public Works' administrative chain of command worked according to Fradesso's wishes: every specific complaint was met by ordinances addressing it. The problem arose with Interior, whose minister was also the prime minister, because, in essence, prefects and administrators sent back to Lisbon a different postcard of the problem. The Interior was less prone to follow Fradesso's every indication and not ready to take the blame for lack of compliance with the law. While Interior tended to stress people's ignorance, the force of habit and the sloppy work done by the Department as major obstacles, Fradesso gathered from the reports and official letters he received that hardships, «which should have as sole origin the natural repugnance of the people for such innovation [...] have as main origin the carelessness of administrative authorities, and the sloppiness of municipalities [...] it is plainly demonstrated that the inspective service hinges on new reforms, which I think urgent».¹⁶⁰ A month later, Fradesso again proposes to organize the inspective service independently from municipalities. As before, to no avail. Fradesso actively tried to reverse the organization of the inspective service laid down by decree-law 29-9-1860. In December 1861, he wrote:

«Unfortunately, administrative authorities in general do not abide by the law, do not contribute to put the law into force, and thus I fear that shortly they will be able to annul what we have accomplished with effort and sacrifice [...] it is a big mistake to keep charging municipalities with a service they have abandoned».¹⁶¹

Early in 1862, Fradesso desperately wrote to his minister exposing the lack of cooperation and unlawful practice of municipalities, even in Lisbon.¹⁶² Municipal clerks refrained from passing fines and inspecting, as they ought to. These procedures in the capital then fuelled unlawful practices elsewhere, in a domino reaction. Up until May, Fradesso was in a crescendo of indignation: the reform found little resistance in the people, which resisted only «when prompted to», and huge obstacles in authorities.¹⁶³

He lamented that even «obedient» municipalities now wanted old weights back, crying against authorities who did not enforce the law in other municipalities. To his eyes, this was proof that «the reaction does not come from where it was expected». He stated that «old weights are generally still in use in most shops. Impunity is begetting its fruits».¹⁶⁴

He spent the whole summer in fieldwork. On reporting back, he could neither «ascertain that the new legal system of linear and weight measures is fully in force», nor the contrary. Among the many causes for infractions, he does not count «people's resistance», because he discounts «a certain natural repugnance for innovations, repugnance which can be overcome by deploying certain measures the government, and its deputies, certainly are aware of». Infractions were caused by neglect in elementary teaching, bad organization of the service, lack of energy of municipalities and lack, «I would not say of strength, but of conviction or freedom from the authorities in the exercise of their functions».¹⁶⁵

One year later, he travelled across the districts of Lisbon and Santarém, carrying out an extensive inspection. To his bewilderment, he found an immense number of violations of the law. Early in September, he submitted a lengthy report to the minister of Public Works and Prime Minister, the Duke of Loulé. The number of infringements was so high he decided not to wait for the final report to denounce what he had found. He also enclosed a number of official letters he had written to prefects and administrators, exposing said infractions and asking for immediate action.¹⁶⁶ In the municipality of Barquinha, «the example of infringement and abuse» was given by the administrator, paradoxically the «authority to which the inspective service is charged». In Alcochete and Aldeia Galega, «abuses are great and frauds considerable». Infractions were perpetrated by parish commissars and he had «prompted competent authorities to punish offenders, with special mention to public officials». In the municipality of

Almada, abuse was generalized. Bearing in mind these «facts», he «deplored the inspectorate being dependent on municipalities and administrative authorities».¹⁶⁷ Authorities were indifferent and ill-willed, and their reaction was «utterly strong and direct».¹⁶⁸

In an official letter sent that same day to Lisbon's prefect he forcefully calls for action, and comments: «In other countries, the reaction comes from the people, and the reform is backed up by all the strength of authorities. Here, the people being obedient and docile, authorities react against the law, and the example they give is lethal». He anxiously awaited the prefect's deliberation for fear of losing «everything that has been done».¹⁶⁹

That did it. Perhaps the minister of Public Works and Prime Minister had had too much of Fradesso's obsession and decided to tell him off, or maybe when confronted with a strong-minded top official trying by every means to put into practice a reform with which he had spent the last decade of his life, Loulé was forced to be crystal clear.

«In spite of the fact that in the adoption of the new legal system of weights and measures many breaches have been made, not only by traders and shopkeepers, but also by the authorities to whom the enforcement of the law is charged, *and because it is not possible nor convenient, and the government itself does not wish it that way, that this system be established by force in the country, but only by persuasion*, Your Excellency, in performing the functions assigned to you as the head of the Department of Weights and Measures, ought to behave with all the moderation and circumspection you can muster, in order to avoid the uproar which could result from excess strictness in the application of penalties and fines established by the law to offenders, except, however, when the latter be commissars or whichever other authority having its own shop, in which case you should proceed against them with all rigour in the law».¹⁷⁰

Fradesso, not discouraged by the reprimand, continued his crusade, but no longer nurtured any illusions. A month later, it was a disappointed yet still vigorous Fradesso

who, in a confidential official letter to the prefect of Santarém, left no doubts of what he thought of the whole affair:

«The use of old weights is generalized. This fact proves that the administrator did not follow superior orders, or does not have the strength to put the law into force. It seems inevitable that he resign [...] the resignation of Barquinha's administrator would act as a healthy example, and perhaps it would bring about abidance of the law in the municipality of Tomar, where I have just seen that the use of old weights is generalized, due to sheer lack of action from authorities, and in Torres Novas where one also notices the lack of vigour and zeal from the Administrators and the Municipality. *The people are obedient and docile. All the harm comes from the lack of subaltern authorities enlightened enough, with muscle enough to command observance of the law, or from the lack of positive orders, which to my mind are dependent on superior ranks*». ¹⁷¹

Implementation Reports

Reports sustain the view that the enforcement of the metric system was based as much on the application of legal penalties as, if not more, on the collaborative efforts pursued by inspectors while visiting municipalities. Harshness and strictness would follow caution and prudence when the latter's capacity to beget compliance was considered to be exhausted. The strategy consisted of two complementary stages unfolding over time. The first prioritised prudence and cooperation; the second, stressed harshness, focusing on legal penalties. Correspondingly, reports pertaining to the first type tend to present a narrative in which the inspector narrates the course of action he followed to overcome antagonists and dodge pitfalls. Reports pertaining to the second kind tend to be clearer in the identification of those adversative realities, pointing out the reiterated incapacity of municipalities to carry out inspection duties, thereby advocating a more straightforward application of the law.

The collaborative efforts of inspectors

To an important extent, compliance had to do with the inspector's agency in bringing together relevant actors to generate a certain effect. Let me briefly present the account of one such inspection. Shortly after receiving his orders on July 18, 1861, inspector Cunha took to the dockyards in Lisbon, where he caught the steamboat «D. Luiz», and set off for a journey to Sines, a coastal village in Alentejo some 150 kms south of Lisbon. He disembarked in the port of Sines in the early hours of July 21. Cunha had been charged with inspecting the municipalities of Alcácer do Sal, Grândola, and Santiago do Cacém.

Formerly an autonomous municipality, Sines was now part of Santiago. Cunha immediately learned that Sines' cork manufactures and retailers already had the new weight standards, and that shopkeepers accepted the kilogram. They were only waiting for instructions from the municipality's head, Santiago. The inspector arrived there on July 22. First, he looked for the president of the municipal body, who could not be found. He then looked for the vice-president, who informed him that new weights were not in use. In fact, there was no municipal gauger, and therefore the entire gauging inspection was lacking. Cunha and the vice-president decided to summon a meeting of the municipal body to set things straight, which took place on July 25. On that occasion, Cunha gave a speech, after which the municipal secretary drafted an edict summoning major shopkeepers and traders in town to a meeting later in the day. Some of the merchants attended the meeting. The vice-president made a «brief but clear exposition», after which «all of us, recognizing the social advantages of the new system, gladly agreed to carry out the reform». A few shopkeepers voiced minor complaints. Next, the municipal body decided to issue an edict. The announcement set August 15 as the definitive deadline, appointed a skilled gauger just arrived from Lisbon, and advertised

where gauging procedures and the selling of weights should take place. Finally, the edict solemnly advised everyone to be prepared to abide by the law before the deadline was up, as afterwards the penalties would be fully enforced.

«I stayed in this municipality so that I could eliminate any remaining difficulty, and I saw with great satisfaction that on the designated date for the selling of fish and meat by new standards, the people in general gladly welcomed the substitute, going as far as to say that they understood the new system perfectly, and never again would desire weights other than the new ones».¹⁷²

In neighbouring Grândola, everything was «lagging behind». No shop had the new standards; «everybody seemed to ignore the existence of the decree 20-9-1860, or at least think it did not concern them». Authorities told the inspector the system was not in place because of «people's repugnance» to accept it. The municipal body and the administrator decided to wait on new instructions from the government.¹⁷³ What follows is a similar account of meetings between the inspector, municipal councils and administrators, then between aldermen and major shopkeepers and retailers, butchers and fishmongers, followed by the issuing of an edict setting a new deadline (in Grândola, the new deadline was September 1; in Alcácer do Sal, September 16). At those meetings, inspectors lectured on the new system's advantages and the old's shortcomings using «persuasive and soft methods», listened to complaints, and reassured everyone that the government had no intention of postponing the deadline once more. Inspectors received assistance from municipal administrators. On August 16, 1861, Alcácer's addressed aldermen and local traders gathered in the town hall:

«The administrator [...] gave a long and judicious speech, beginning with the reasons which have contributed to the fact that the new system is not yet fully in force in this municipality [...], praising the reform's merits, and noting the absolute necessity of giving full compliance to the law [...] because he accepted to harmonize things, conceding, in accordance with the municipality, an extended deadline to this effect; however, once the latter was over, he would be tireless in the

faithful enforcement of the September 20, 1860 decree, never failing to apply the penalties contained therein to each and every offender». ¹⁷⁴

Prudence will beget more profitable results than fines

The story I have told so far is exemplary because it is modal. Most reports tell similar stories. Why? The straightforward answer is: inspectors were following orders. From confidential letters sent to every district inspection by the Department's head, I have learned that at the end of June 1861 there was a considerable delay in the provisioning of district deposits with kilo standards. Since, for fear of consequences, the government did not want to postpone the deadline:

«During the period needed to complete arrangements and prepare the people to abide by the law, municipalities must not be rigorous in the inspection, and avoid the enforcement of legal fines and penalties. It is important for me to utter these remarks, leaving to your zeal and prudence the choice of the more suitable means to make the necessary innuendos to Municipalities; nevertheless, I advise you to make them strictly verbal and by someone of your absolute confidence». ¹⁷⁵

Within a week, Silveira advised, again confidentially, the president of the municipality of Abrantes that «there must be tolerance and benevolence in the early days and until the arrival of the shipments of weight standards». ¹⁷⁶ The Lisbon inspector, writing in mid-August 1861, and while agreeing to postpone the deadline; recommended:

«Restraint, prudence, insinuating manners should precede harshness [...] It is indispensable that inspections be regular, without being harsh towards simple ignorance, but rather severe to continuing and purposeful offenders; and that bailiffs and delegates of administrative authorities use the greatest docility they can muster in the advice they make, for prudence will beget more profitable results than fines». ¹⁷⁷

Prudence is not enough

Little by little, reports and archival sources evince a growing impatience. Over two months after the official deadline, prudence seemed not to be enough. Introducing to the minister a report on a set of municipalities in the district of Lisbon, Fradesso explains:

«In order to achieve full abidance, authorities, while being prudent, must not cease being forceful. The moderate exercise of inspection is an efficient means to beget the desired result, without violence. To leave people to themselves, to not oversee, to save friendly warnings which should always precede the harsh application of legal penalties, that is not prudence, but neglect and carelessness which deserve to be punished».¹⁷⁸

In confidential letters, Fradesso was much more explicit. Abstract references to «authorities» acquired a sharp outline. His growing impatience translated into attribution of guilt. Municipalities were major obstacles. Writing to his minister, he quotes a confidential letter addressed to him: «we cannot rely on municipal officials. We may even be sure that instead of cutting down abuses they will rather consent and encourage them». To Fradesso's mind, such testimonies do no more than confirm his stand «against the intervention of municipalities in the gauging inspection and in the direction of the service of weights and measures» (let me recall that the decree 29-12-1860 had entrusted municipalities with the gauging inspection).¹⁷⁹ Fradesso never tired of explaining that the reform's secret lay in the inspectorate. And this was where municipalities botched. In September 1861 he complained:

«Though some infractions are to be expected in the beginning, it is not natural, and cannot be explained, nor permitted, that administrative authorities and municipalities endorse with their silence and neglect the continuation of abuses. Prudence was recommended by the government, and is indispensable when reforms are at stake; yet prudence [...] is neither resignation from inspection, nor tolerance for every abuse».¹⁸⁰

The reports detail the municipal inspectorate's breakdown. In Ponta Delgada the malfunction was attributed to a misleading division of competences: «because it is not well defined to whom inspection is trusted, everyone feels exempt from it».¹⁸¹ One does not find this puzzlement in the writings of other inspectors. In Leiria, as elsewhere, the inspective service was entrusted to municipalities. Among the aldermen there were «eminent jurists» and other men «knowledgeable of other specialities; nonetheless, devoid of the necessary skills to exert inspection [...]. Notaries, bailiffs and municipal clerks, who are the ones exercising inspection in practice, worse still». In spite of believing they are «animated by good will», the inspector concluded that «they cannot, because they do not know how to».¹⁸²

Sharpening their focus ever more, the reports converge in attributing the failure of municipal inspection to gaugers. They became an obsession of inspectors' critique: «Those men completely incompetent to exercise their job, called gaugers, are people from the localities, most of them ordinary or extraordinary municipal employees. Some get one, others two, others four coins for annual gratification; others still, as in Leiria, have bid at auction for the gauging».¹⁸³ Grândola's interim municipal gauger was completely unaware of the sets of new weight standards: «Not only for this reason, but also because of most feeble precepts of elementary instruction, and because of a somewhat rowdy life, he does not give assurance».¹⁸⁴ The inspector therefore took action to replace him.

Portalegre's inspector showed remarkable perspicacity to what Scott calls «weapons of the weak», that is the multifarious forms of resistance (discourse, agency, gesture, bodily language, etc.) to the imposition of an externally binding order.¹⁸⁵ Whenever local authorities have pushed forward and inspected the employment of new weights, people have been quiet and the law observed, he submitted. Wherever

municipal bodies are «lively» and «active», the employment of the new system is «satisfactory»; on the contrary, in municipalities where there is indolence and lack of interest for the *res publica* there is nothing but «a counterfeit execution of the law».¹⁸⁶ The inspector realized that in every shop «there is but a mock observance of the law»: «they merely put the weights on display over the counter». Very perceptively, he stressed the importance of different regimes of visibility, which led him to surprisingly reverse the link between order maintenance and «the crowd».

«The use of some rigour against private shops would be utterly convenient. Tolerance and prudence which were recommended to authorities, when one does not make use of the appropriate means, are just contempt for the law. The employment of the new system is more rigorous in markets and fairs, where authorities might be obliged to deal with thousands of individuals, than in the single private shop, where any forceful action would not have the consequences which would perhaps be manifest in a large assembly of people. A little more energy and strength of will from local authorities, and the development of elementary education, could give the implementation of the metric system a different face altogether».¹⁸⁷

As usual, the gloomy picture of the municipal world served instrumental purposes. The Department sought to place the gauging service under its belt of competences. The general acceptance of new measures hinged upon «the strength and intelligence of authorities». However – it was reasoned –, no «zeal», «energy», or «intelligence» of authorities would do if there was not a *permanent specially appointed inspection* staffed by properly skilled officials.¹⁸⁸

The centrality of markets

Problems mushroomed in the municipality of Lisbon. The capital's wholesalers were still shipping commodities and foodstuffs to neighbouring municipalities using old weight standards: «every shipment of different foodstuffs sent by Lisbon shopkeepers,

such as fisheries, bakeries, groceries, etc., to supply the municipalities I have visited, and probably many others, was done using illegal weights». ¹⁸⁹

Problems in the municipalities of Lisbon and Porto brought on the nationwide market issue. It did not occur to reformers that the centrality of larger markets might work against their wishes. Local metrologies were very sensitive to commercial fluxes originated from Lisbon and Porto, especially those of markets located upstream. If the larger and most important market kept on using an older metrology it would be very hard for the smaller, local market to adopt a new system. In Castelo Branco (upstream the Tejo), the question was that Lisbon and Porto wholesale traders were issuing invoices and shipping commodities referred to old weight measures, compelling local retailers to conversion calculus, which they did not feel up to. ¹⁹⁰ This state of affairs triggered confusion in the river customs. Moreover, commercial travellers would not propagate the system on horseback, across inland regions far from river basins.

The misbehaving ignorant people

Shopkeepers kept on using old weights because, they reportedly said, customers ordered foodstuffs by reference to them. In Grândola, one merchant declared he feared the people and «thought his life endangered by such an innovation». ¹⁹¹ If commoners, when going to the butcher, grocer or baker did not see the new weights in use, even if they were displayed «over the counter», they would not order meat, vegetables or bread using the kilo. To inspectors' minds, only shopkeepers could break such a vicious circle because lay people «will always continue to order by old weights». ¹⁹² In fact, Angra's inspector reproached: «Legal provisions condemning old standards as improper to civilization and progress must be respected by the vendor *as well as by the buyer*». ¹⁹³ Common people misbehaved, reportedly, because they were ignorant, and ignorance had to be offset by elementary education. But the latter did not rise up to the occasion:

«School manuals either do not show the new system or display both new and old showing the equivalences. Schoolmasters, generally little educated, unconscious of their mission, keep on teaching the abolished system [...] and do not give the proper attention to the new one. It is clear that, in so doing, the new generation, which should be wholly for us, will continue the reactions and to favour the routine resistances the reform faces in its path».¹⁹⁴

Conclusion

To enforce the law, to implement the metric system, in spite of legal rhetoric to the contrary, did not meant exclusively, or perhaps *not even crucially*, the deployment of legal penalties via the judiciary system. To be sure, the latter played an important role, although – I argue – a complementary one. As this chapter has shown, enforcement was conceived by politicians and reformers alike as a spectrum of practices distributed along an axis polarized by two ideal types: from transactional enforcement, appeasement and co-operation to one-sided legal and coercive enforcement. On the one hand, a notion of enforcement based on the capacity to enrol heterogeneous actors, mobilising their good-willed efforts, inherently based on a intermediate and indirect relationship; on the other, a notion based on direct and coercive relations, evaluating the inability to obey legal norms, unambiguously punishing disobedience, and resorting to disciplinary charges and penal sanctions, if need be. Public authorities saw the two types as stages, unfolding in a complementary manner over time.

To enforce the metric system meant to enforce something which countered deeply rooted cultural traditions and practices, to brush aside fiscal and administrative habits of traditionally independent municipalities; and face head on powerful commercial interests. This was to be done through a set of fragile central administrative apparatuses which relied heavily on policy brokers, «middle-men» and local notables. In order to generate acceptance and convince the people to use the system, the state

relied on the enrolment of elementary school teachers and priests, who were deemed essential in spreading the «metric gospel». This in turn led to issues concerning the relation between Public Works and the Interior, between the civilian administration and the Church, and between central and local administrative levels. Along with institutional attrition which had to be smoothed out, the reform triggered significant popular resistance.

A point worth mentioning is the way in which the rationale of implementation ended up running against the functional rationality of the overall reform. According to the latter, one should reform first where one could collect more advantages from the reform and/or where the need of reform was more acute. If nothing else, comparisons made clear the extreme variance of capacity measures, less of weights, and lesser still of linear standards. Therefore, capacity measures ought to have been standardized first. However, these *a priori* theoretical considerations were superseded by the practicalities of implementation. When it came to scheduling the enforcement of standards, the main consideration was expectable resistance, not expectable advantage. This led to enforcing first that which was «easiest» to enforce – the metre, then the kilo – and not that which was more advantageous – the litre.

* * *

In attempting a provisional interpretation of popular resistance, it is perhaps useful to classify it under two «ideal types», which I will designate *passive* and *pro-active*. I think these types useful to illuminate a crucial difference: the potential for political mobilisation. «Passive» forms of resistance are typically individual and micro-scale. They resort chiefly to language games and bodily expression in face-to-face situations or in the way ordinary people go about their ordinary lives. Importantly, these practices do not disrupt the routinely flow of time. James C. Scott called them «the weapons of

the weak». Because they tend to be ascribed to the domain of private individuals, they are less prone to manipulation or orchestration. Thus, they seem to be less politicised than collective or publicly staged forms. However, if overwhelmingly shared by a population, these forms can pose insurmountable obstacles to «modernizing» change. Their scattered nature makes it difficult to deploy pinpoint coercion, their elusiveness defies inspection, and their ductility favours outright cunning. Visiting small shops around the countryside, inspectors realized that shopkeepers had two sets of weights, the metric over the counter and the old behind it. The minute the inspector left the shop, sets would exchange positions. It was not an illegal practice according to the law, they argued, since old weights were not being used to measure commodities, but just as a referent to ease the acceptance of the new system. Such pieties did not convince Fradesso.¹⁹⁵

«Pro-active» forms of resistance tend to be macro and collective. They also have to do with language and bodily expression, but of a different kind. They are voiced out loud, expressed mainly in public space: the town square, the street, or the working locale. They disrupt the routine flow of time, and are experienced as extra-ordinary. They can be classified according to their intensity and to the volume of resources amassed, from a demonstration, to an upsurge, to a riot, to a rebellion. They are usually countered by a display or the threat of physical force by specialized corps, such as the military or the police. By virtue of their eminently public nature, these forms of expressing discontent acquire from inception a political dimension. As such, they are prone to manipulation, or fear of it, from either the government or the opposition, in any given political setting or scale.

How to interpret these practices?

Since the floods of 1856 and 1857, the peasantry was greatly impoverished. Agricultural output was acutely affected: crops were small, and cereal prices rocketed in the forthcoming years. Hence, the rise in consumer taxes decreed by Fonte's centre-right government in 1857/58 met with a very strong reaction: peasants everywhere rebelled against the aggravating fiscal reform. The predicament of peasant economies had not changed by the beginning of the 1860's, when the new centre-left government of Loulé was in office. Household economies were compressed to the utmost. This meant that the slightest decrease in income, be it the result of reduced wages or increased prices, had a disproportionate effect on the whole domestic economy. Simply, there was not much more room to breathe. In 1863, the price of Portuguese cereals ranked among the highest in Europe, and cereals constituted the basis of nutrition. A slight rise in the price of the bread due to the conversion to the metric system, although the quantity would also be bigger, was the drop too many that spilled the glass in the Setúbal mutiny. If one recalls the narrative, initial demonstrations against work conditions rapidly morphed into systematic plundering of bakeries, followed by breaking into the municipal weights' depot, where demonstrators seized new weights and threw them into nearby wells and sea. Incidentally, newspapers had already alerted to the fact that the new price of the bread would require coins of a certain amount which did not exist, and without which bakers were obliged not to give the correct change or to being always short of change for clients.

If one surveys daily newspapers through 1861 and 1862, one will find almost every other day news of some kind of upsurge. Mutinies against new weights were reported, alongside dozens of insurrections of the same sort, only with different objects of insurrection, virtually all around the country, in tiny hamlets, and in major villages and towns. Let me give an example from the *Revolução de Setembro* of 16-7-1861.

«On the night of the 9th to the 10th of the current month, the door of the Department of Public Treasury of this municipality was broken down, and from inside were subtracted the better part of land registries, concerning this year's land tax, which were subsequently burned down by the populace [...] Once the respective body of evidence was investigated, it was not possible to evaluate who the perpetrators or accomplices were, and so the public prosecutor was only able to craft an accusation against 'unknowns'. [§] The fiscal clerk of the municipality has long been accused of manufacturing said land registries despising the counsels of the informants. I do not know if such an assertion is well founded, but nevertheless I suppose that it was the origin of said crime».¹⁹⁶

In 1861 and 1862, and generally throughout the 1860's, one sees a multiplication of this kind of insurgencies. Let me enumerate the objects of protest: metric standards, metric scales, land registries, conscription lists, and geodetic signs. Each one of these objects corresponds to a specific state policy, usually described as a «modernizing» one, through the deployment of which the «modern state» came to be constituted as modern. They combine some of the oldest distinctively state policies, like the excise and conscription, with some of the newest to the nineteenth century state, geodetic map-making and the metric system of weights and measures. Hence, what these objects have in common is their «state» quality. They are embodiments of the state's will to reach out and touch the day-to-day workings of the realm. As such, they are material symptoms of the state's panoptic presence, and are so felt by commoners. They are the eyes of a new gaze, enabling the state, in Scott's phrase, to *see like a state*. Thus, to destroy them is to symbolically deny the state entrance to a realm hitherto secluded. The sheer existence of these protests is a most telling indicator of the expansion of the state's infrastructural power. Thus, according to this train of thought, resistance to metric weights should be placed in the broader context of the multifarious resistance to the modern state's penetration of the country. If the 1860's were a period in which these forms of protest multiplied, *ipso facto* one concludes they were a period in which

modernizing policies had some sort of impact in the lives of the people. Paradoxically, or maybe not, the widespread resistance to modernizing policies helps to ascertain their historical significance and relevance as objects of enquiry.

Municipal life was rather politicised and reproduced the more general dividing lines of «big politics». These lines had to do as much with personal relations as with ideological affiliation. In fact, given the nature of political parties at the time, local politics, with attendant local notables, caciques and patrons were the fabric of which national parties were fashioned. This means, of course, that allegiances were not stable; coat-turning was widely viewed as a natural, albeit embarrassing, phenomenon. National, as well as local politics were increasingly influenced by a political public sphere, which emerged around newspapers. All newspapers had a distinctive political affiliation, and, considering the high illiteracy rate, they were widely circulated: local newspapers, locally; Lisbon and Porto newspapers, nationwide. Moreover, articles printed in local papers fed the «news from the provinces» columns of national papers, since there were no local reporters, only local «affiliated» papers of like political colour. On the other hand, news of what was happening in a certain part of the country was invoked as a political argument by someone in a faraway locality, through having read them in a nationally circulated paper. For instance, the Lisbon-based *Revolução de Setembro* reported the Setúbal mutiny of August 1861 on the 14th. The Porto-based *O Comércio do Porto* did it on the 18th (re-printing the *Revolução*'s article). These were both opposition papers. The manipulation of a local insurgence to beget a certain political effect, in this case to embarrass the government, was relatively easy to achieve. Newspapers and politics took care of the rest. Eventually, the news was picked up in Parliament, perhaps justifying an interrogation of the minister of the Interior, an enquiry

committee, or, more often than not, merely providing some inspired opposition deputy with a couple of killer phrases to make the headlines of the next morning paper.

Are such resistances a reaction against modernity, as symbolized by the state's will to administer through bureaucracy? And should one equate modernity with the dynamics of the state, in the face of evidence pointing to the importance of traditional mechanisms in the operation of said state? Why, on the other hand, choose as primary interpretative key a sort of anomic reaction against the presence of the state and not, say, against innovation? I cannot but provide some tentative remarks, while leaving these questions hovering as though road signs pointing towards new avenues of research.

There are reasons to be diffident about the extent to which the notion of «the state» worked as an explanatory force in the minds of people who rebelled against measuring standards, geodetic signs or land registries. Indeed, the praxis of rural populations evolved in a traditional environment, in which certainties, regularities, and secure knowledge predominated. Modernity, secularisation and the general waning of traditional societies and states had to do with the breakdown of the dynastic realm and the religious community. To innovate meant to disrupt the sense of security, to exchange the well known (however unfair or unenlightened) for the unknown or the foreign, which commanding forces laid beyond graspable control. More often than not, peasants had good reason to be unforthcoming to innovations. The latter were increasingly perceived as just another, trickier way of exploiting their sorry condition. In this context, the metric system epitomized the completely alien contraption: of foreign origin, unintelligible, externally enforced, ill-suited to traditional use, and justified by tyrannical enlightened formulas.

Moreover, the state was instantiated through intermediaries: the elementary schoolmaster, the elected mayor, the municipal administrator, the bailiff, the policeman, or the gauging inspector. All these characters did not live in bureaucratic insulation, rather they were subjected to influence, engaged in patronage relations, and generally in the pervasive reciprocal logic of the gift which embedded social relations. Hence, to local populations, those officials *were* the state. Therefore, the argument goes, peasants could not possibly be rebelling against «the state» since they did not perceive it as a concept, but rather as a set of interlocutors. If one argues for the unlikeliness of the «state-as-concept» in the minds of rebellious-prone peasants, let us say nothing of «modernity».

Notes

¹ «Viva a Maria Bernarda/Com o seu lenço ao pescoço/Novos direitos em baixo/Os quilogramas no poço». Altered lyrics to the «Maria da Fonte» rebellion hymn, sang by insurgents in the Minho riots, April/May 1862, quoted in Lélío Lenoir, *Portugal em 1862*, Lisbon, Imprensa de J. G. de Sousa Neves, 1863, p. 46.

² Decree 13-12-1852, preamble. All following quotes are from the decree's preamble.

³ Decree 13-12-1852, preamble.

⁴ J. P. de Oliveira Martins, *Portugal Contemporâneo*, vol. II, Lisbon, Guimarães Editores, 1996, p. 240.

⁵ Decree 13-12-1852, preamble.

⁶ Decree 13-12-1852, preamble.

⁷ Decree 13-12-1852, preamble.

⁸ Decree 17-2-1853.

⁹ J. H. Fradesso da Silveira, *Relatorio ao Ill.mo Sr. Antonio de Serpa Pimentel ministro e secretario de Estado dos negocios das obras publicas, commercio e industria por...*, Lisbon, Imprensa Nacional, 1859, here p. 20.

¹⁰ J. H. Fradesso da Silveira, *Relatório anual dos trabalhos da Comissão Central de Pesos e Medidas*, ms., xv pp., 19-1-1856, DGCAM RC 37, AHMOP.

¹¹ J. H. Fradesso da Silveira, *Diário do Governo*, n. 165, 16-7-1855, pp. 910-911.

¹² Silveira, *Relatório anual dos trabalhos da Comissão Central de Pesos e Medidas*, doc. cit., 19-1-1856.

¹³ Silveira, *Relatório anual dos trabalhos da Comissão Central de Pesos e Medidas*, doc. cit., 19-1-1856.

¹⁴ Fradesso da Silveira to Joaquim Larcher, ms., 12-3-1856, v pp., DGCAM RC 37, AHMOP.

¹⁵ Joaquim Larcher to minister Public Works, ms., 28-6-1856, ix pp., DGCAM RC 37, AHMOP.

¹⁶ Marquis of Ficalho to Duke of Loulé, *Relatório dos Trabalhos executados em 1856*, ms., 3-3-1857, DGCAM RC 37, AHMOP.

¹⁷ Joaquim Larcher to minister Public Works, ms., 29-7-1857, DGCAM RC 36, AHMOP.

¹⁸ Fradesso da Silveira to Joaquim Larcher, ms., 11-9-1857, DGCAM RC 36., AHMOP.

¹⁹ Silveira, *Relatorio ao Ill.^{mo} Sr. Antonio de Serpa Pimentel...*, op. cit., 1859, p. 20.

²⁰ Vd. concept of «translation» and «diffusion» in Bruno Latour, «The powers of association», in John Law, ed., *Power, Action and Belief. A New Sociology of Knowledge?*, London/Boston, Routledge & Kegan Paul, 1986, pp. 264-280, here pp. 265-268

- ²¹ Chapter by Antonio Gramsci, 1971 [1929-1937], in David Held, ed., *States and Societies*, New York, NYU Press, 1983, p. 242.
- ²² Cf. Ronald Edward Zupko, *Revolution in measurement: Western European weights and measures since the Age of Science*, Philadelphia, American Philosophical Society, 1990, pp. 200-207.
- ²³ See fieldwork instructions in Silveira, *Relatorio ao Ill.^{mo} Sr. Antonio de Serpa Pimentel...*, op. cit., 1859, pp. 20-21.
- ²⁴ Michel Foucault, «Governmentality», in Graham Burchell, Colin Gordon and Peter Miller, ed., *The Foucault Effect. Studies in Governmentality, with lectures by and an interview with Michel Foucault*, London, Harvester, 1991 [1978], pp. 87-104.
- ²⁵ Theodore Porter, *Trust in Numbers. The pursuit of objectivity in science and public life*, Princeton, Princeton University Press, 1997, pp. 4-5.
- ²⁶ António Cardoso Avelino to Joaquim Larcher, ms., 6-3-1855, DCCAM-RC 36, AHMOP.
- ²⁷ J. H. Fradesso da Silveira, *Compendio do novo systema legal de medidas, aprovado pela comissão central de pesos e medidas*, Lisbon, Tip do Centro Comercial, 1856.
- ²⁸ Fradesso da Silveira to Rodrigo da Fonseca Magalhães (minister of the Interior), ms., 14-11-1855, p. iii, DGCAM-RC 36, AHMOPC.
- ²⁹ Ministerial ordinance 18-9-1858.
- ³⁰ Silveira, *Relatorio annual dos trabalhos da Comissão Central de Pesos e Medidas*, doc. cit., 19-1-1856.
- ³¹ Joaquim Larcher to minister of Public Works, ms., 28-6-1856, p. viii, DGCAM-RC 37, AHMOP.
- ³² Fradesso da Silveira to António de Serpa Pimentel (minister of Public Works), ms., 6-6-1859, DGCAM RC 36, AHMOP.
- ³³ Silveira, *Relatorio annual dos trabalhos da Comissão Central de Pesos e Medidas*, doc. cit., 19-1-1856, p. xiv. See also Isidoro Emílio Baptista, *Relatório lido em sessão da Comissão Central de Pesos e Medidas, no dia 10 de Março de 1857, pelo vogal da mesma Comissão Isidoro Emílio Baptista*, ms., xxix pp., 10-3-1857, DGCAM RC 37, AHMOP.
- ³⁴ Silveira, *Relatorio ao Ill.^{mo} Sr. Antonio de Serpa Pimentel...*, op. cit., 1859, p. 5.
- ³⁵ Silveira, *Relatorio ao Ill.^{mo} Sr. Antonio de Serpa Pimentel...*, op. cit., 1859, p. 20.
- ³⁶ Joaquim Monteiro Jr. and Francisco Moya, «Relatorio dos officiaes encarregados da comparação das medidas e pesos dos concelhos de Cascaes, Cintra, Mafra, Torres Vedras, Lourinhã, Cadaval, Alemquer, Azambuja e Arruda», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. x, 1857, pp. 482-486, quote p. 482.
- ³⁷ Francisco Neves, «Inspeção de pesos e medidas do districto da Guarda. Relatório», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. iv, 1860 (1859), pp. 369-392, quote p. 370.
- ³⁸ Francisco Neves, «Inspeção de pesos e medidas do districto da Guarda. Relatório», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. iv, 1860 (1859), pp. 369-392, quote p. 370.
- ³⁹ Luís Espinha da Silveira, *Território e Poder. Nas origens do Estado Contemporâneo em Portugal*, Cascais, Patrimonia Historica, 1997.
- ⁴⁰ João Bettencourt and Bernardo Chaby, «Relatorio da comissão encarregada de fazer as comparações dos pesos e medidas dos novos padrões do systema metrico no districto de Leiria», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. v, 1858, pp. 540-546, quote p. 542.
- ⁴¹ João Silveira and Joaquim Graça, «Relatorio da comissão encarregada da comparação das medidas usadas no districto de Santarem com o sistema metrico decimal», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. i, 1858 (1857), pp. 83-93, here p. 85.
- ⁴² Libânio Valle, «Relatorio da inspecção de pesos e medidas no districto da Horta», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xii, 1859, pp. 634-644, here p. 634.
- ⁴³ Francisco Oliveira, «Relatorio das comparações das medidas antigas com as do systema metrico-decimal, no districto administrativo do Funchal», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. x, 1859, pp. 459-467.
- ⁴⁴ Neves, «Inspeção...», op. cit., 1860 (1859), quote p. 371.
- ⁴⁵ Oliveira, «Relatório...», op. cit., 1859, quote p. 462.
- ⁴⁶ Silveira and Graça, «Relatório...», op. cit., 1858 (1857), quote p. 83.
- ⁴⁷ Manuel Pereira and António Arouca, «Relatorio dos inspectores dos pesos e medidas Relatorio dos concelhos de Cezimbra, Setubal, Alcacer, Grandola, S. Thiago do Cacem, Aldeia Gallega e Alcochete», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xi, 1857, pp. 631-633, quote p. 632.
- ⁴⁸ António Arouca and Bernardo Chaby, «Relatorio dos officiaes encarregados da comparação dos pesos e medidas antigas com as do novo systema metrico decimal no districto de Beja», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. i, 1859 (1858), pp. 67-68.

- ⁴⁹ Francisco Silva and José Silva, «Relatorio das comparações das medidas antigas com as do systema metrico decimal no districto administrativo de Coimbra», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. v, 1859, pp. 337-339, quote p. 337.
- ⁵⁰ José Silveira, «Relatorio da comparação das medidas antigas com as modernas, no districto administrativo de Ponta Delgada», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. v, 1859, pp. 330-336, here p. 335.
- ⁵¹ Pereira and Arouca, «Relatório...», op. cit., 1857, quote p. 632.
- ⁵² Manuel Pereira and José Monção, «Relatorio dos officiaes encarregados da comparação dos pesos e medidas antigas com as do novo systema metrico decimal no districto de Castello Branco», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. vi, 1858, pp. 723-724, quote p. 724.
- ⁵³ Gregorio Collaço, «Relatorio ácerca do ensino do systema metrico-decimal no districto de Leiria», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xii, 1860, pp. 569-571, quote pp. 569-570.
- ⁵⁴ Joaquim Heitor, «Relatorio sobre o ensino do systema metrico-decimal no districto de Villa Real», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xii, 1860, pp. 574-577, quote p. 577.
- ⁵⁵ Fernando Camello, «Relatorio sobre o ensino do systema metrico decimal no districto do Porto», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. iv, 1860, pp. 405-407, here p. 406.
- ⁵⁶ António Beja, «Inspeção dos pesos e medidas do districto da Horta. Relatorio do ensino do systema metrico-decimal», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xii, 571-573, quote p. 572.
- ⁵⁷ Heitor, «Relatório...», op. cit., 1860, quote p. 575.
- ⁵⁸ António Nóvoa, *Le temps des professeurs : analyse socio-historique de la profession enseignante au Portugal (XVIIIe-XXe siècle)*, vol. II, Lisbon, INIC, 1987, pp. 236-240; Rómulo de Carvalho, *Historia do ensino em Portugal. Desde a fundação da nacionalidade até o fim do regime de Salazar-Caetano*, Lisbon, Fundação Calouste Gulbenkian, 1986, pp. 582-586, 607-612.
- ⁵⁹ Camello, «Relatório...», op. cit., 1860, quote p. 405-406.
- ⁶⁰ Joaquim Graça, «Inspeção dos pesos e medidas do districto de Santarém. Nº 1», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xii, 1859, pp. 636-638, quote p. 637-638.
- ⁶¹ Nóvoa, *Le temps...*, op. cit., 1987, pp. 373-411, here p. 378.
- ⁶² Nóvoa, *Le temps...*, op. cit., 1987, pp. 388-389.
- ⁶³ Heitor, «Relatório...», op. cit., 1860, quote p. 577.
- ⁶⁴ Heitor, «Relatório...», op. cit., 1860, quote p. 577.
- ⁶⁵ Heitor, «Relatório...», op. cit., 1860, quote p. 577.
- ⁶⁶ Francisco Oliveira, «Relatorio dos meios empregados para o ensino e propagação do novo systema de pesos e medidas, e dos resultados obtidos por esses meios no districto administrativo do Funchal», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. iv, 1860, pp. 400-405, quote p. 401.
- ⁶⁷ Oliveira, «Relatórios dos meios...», op. cit., 1860, p. 402.
- ⁶⁸ Quoted in Nóvoa, *Le temps...*, op. cit., 1987, p. 342.
- ⁶⁹ Oliveira, «Relatórios dos meios...», op. cit., 1860, p. 402.
- ⁷⁰ Fradesso da Silveira to minister of Public Works, ms., 30-8-1858, DGCAM-RC 36, AHMOP.
- ⁷¹ Minister of Public Works to minister of Justice, ms., 8-9-1859, MOPCI RC 13, AHMOP.
- ⁷² Minister of Public Works to minister of Justice, ms., 7-11-1859, MOPCI RC 13, AHMOP.
- ⁷³ Oliveira, «Relatórios dos meios...», op. cit., 1860, here pp. 402-403, quote p. 403.
- ⁷⁴ Collaço, «Relatório...», op. cit., 1860, quotes p. 570 and pp. 570-571.
- ⁷⁵ José Silvestre Ribeiro, «Ensino do systema metrico-decimal» in José Silvestre Ribeiro, *Historia dos estabelecimentos scientificos, litterarios e artisticos de Portugal nos sucessivos reinados da Monarchia*, Tomo XI, Lisbon, Tip. da Academia Real das Sciencias, 1883, pp. 433-453, here p. 440.
- ⁷⁶ Fradesso da Silveira to António de Serpa Pimentel (minister of Public Works), ms., 6-6-1859, DGCAM RC 36, AHMOP (emphasis in the original).
- ⁷⁷ Melo Archer to Loulé (minister Interior), ms., 29-11-1856 and Joaquim Larcher to Central Board of Weights and Measures, ms., 20-1-1857, MOPCI-RC 13, AHMOP.
- ⁷⁸ For example, Carlos Bento da Silva (minister Public Works) to Marquis of Loulé (minister Interior), ms., 13-3-1858, MOPCI RC 13, AHMOP.
- ⁷⁹ Francisco Silva, «Relatorio acerca do ensino do systema metrico no districto de Coimbra», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. iii, 1860, pp. 280-283, here p. 283.
- ⁸⁰ Camello, «Relatório...», op. cit., 1860, here p. 406.

- ⁸¹ Fradesso da Silveira to minister of Public Works, ms., 20-8-1861, RPM 4, AHMOP.
- ⁸² Fradesso da Silveira to minister of Public Works, ms., 7-9-1861, RPM 4, AHMOP.
- ⁸³ Inspectors had to hand out a couple of questionnaires, one for each kind of school (public or private). Three out of sixteen questions in the public school questionnaire addressed the metric system: 14th: Does the school have charts for teaching the metric system? Are there any scale models of weights and measures? Are they well kept? [also for private schools]; 15th: Does the schoolmaster teach the metric system? Does he oblige pupils to learn by heart? Does he explain the subject well, so pupils can understand it without wearing their memory? [also for private schools]; 16th: Does the schoolmaster have the necessary skills, and the needed education, to serve (in case of necessity) as a gauger or in the gauging inspection? In Ribeiro, «Ensino do sistema métrico-decimal», op. cit., 1883, pp. 449-450.
- ⁸⁴ Public Works ordinance, 9-11-1861.
- ⁸⁵ IAN/TT, Arquivo Ministério do Reino, DGIP, Livs. 2405-2409 (liv. 20), n.º 324.
- ⁸⁶ Ribeiro, «Ensino do sistema métrico-decimal», op. cit., 1883, p. 451.
- ⁸⁷ Head General Office to Statistics Department, ms., 9-9-1862, MOPCI RC 13, AHMOP.
- ⁸⁸ *Diário de Lisboa*, n. 255, 4-10-1862.
- ⁸⁹ Ribeiro, «Ensino do sistema métrico-decimal», op. cit., 1883, p. 452.
- ⁹⁰ Minister Public Works to General Department of Public Instruction, ms., 26-7-1862, IAN/TT, Archive Minister Interior, Liv. (21), n.º 823 and Public Works/General Office to General Department of Public Instruction, ms., 26-7-1862, MOPCI RC 13, AHMOP.
- ⁹¹ Minister Public Works to General Department of Public Instruction, ms., 30-9-1862, IAN/TT, Archive Minister Interior, Liv. (21), n.º 995 and Public Works/General Office to General Department of Public Instruction, ms., 30-9-1862, MOPCI RC 13, AHMOP.
- ⁹² Articles 1 to 3, ministerial ordinance, 30-9-1862, *Diário de Lisboa*, n. 255, 4-10-1862.
- ⁹³ Ribeiro, «Ensino do sistema métrico-decimal», op. cit., 1883, p. 452. 12-4-1862, the Interior issued an ordinance that asserted: «inspective visitations to elementary schools are undoubtedly the most adequate and advantageous mean to cut down misuses and to provide for the needs of education». This ordinance, considering there was not a permanent inspective body in the Interior, and the relative failure of all extraordinary inspections from 1844 to 1861, charges prefects and municipalities with the general inspection of public and private elementary schools. The ordinance also contains the questionnaires to be applied. Again, one set of questions for private schools, and a different, lengthier one for public schools.
- ⁹⁴ See the questionnaire applied in the public elementary school of Rantes, parish of S. Pedro da Régua, municipality of Póvoa do Varzim, district of Porto, printed and ms., 17-8-1863, IAN/TT, Arquivo Ministério do Reino, DGIP, mc. 4090.
- ⁹⁵ «Número de escolas primárias criadas pelo estado nos districtos do continente e ilhas até Dezembro de 1854, e de então até Dezembro de 1866, por anos e segundo os sexos», *Diário de Lisboa*, n. 32, 9-2-1867.
- ⁹⁶ Interior ministerial ordinance, 12-10-1866.
- ⁹⁷ Interior ministerial ordinance, 12-10-1866.
- ⁹⁸ Pierre Bourdieu and Jean-Claude Passeron, *La Reproduction. Elements pour une theorie de l'enseignement*, Paris, Minuit, 1970, pp. 196-197.
- ⁹⁹ Maria de Fátima Bonifácio, *Apologia da história política*, Lisbon, Quetzal, 1999; Maria de Fátima Bonifácio, *O século XIX português*, Lisbon, ICS, 2002.
- ¹⁰⁰ All quotes are from the Interior ministerial ordinance, 12-10-1866.
- ¹⁰¹ Interior ministerial ordinance, 12-10-1866.
- ¹⁰² In 1867, there was another inspection to elementary schools, whose results amounted to 21 large manuscript volumes. The questionnaire is very long, and contains four sections on weights and measures. The first, enquires if the school held collections of weights and measures' models and scales. The second set of questions was on the teaching method. Finally, two final sections on «classification of the students present to the visitation according to the state in which the inspector has found them in the subjects metric system and Christian doctrine» and «classification the teacher made of the students he had in the year of 1866 according to the state in which in the end of the said year they were found to be in the subjects metric system and Christian doctrine» (an interesting coupling). See IAN/TT, Arquivo do Ministério do Reino, DGPI, mcs. 4090, 4091 and 4092.
- ¹⁰³ Fradesso da Silveira (secretary) to Rodrigo da Fonseca Magalhães (minister Interior), ms., 14-11-1855, DGCAM RC 36, AHMOP.
- ¹⁰⁴ Fradesso da Silveira (secretary to Duque of Loulé (prime minister), ms., 30-6-1856, DGCAM RC 36, AHMOP.
- ¹⁰⁵ Joaquim Larcher to minister Public Works, ms., 28-6-1856, DGCAM RC 37, AHMOP.

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- ¹⁰⁶ Fradesso da Silveira (secretary) to Duque of Loulé (prime minister), ms., 9.7.1856, DGCAM RC 36, AHMOP.
- ¹⁰⁷ Fradesso da Silveira to António de Serpa Pimentel (minister of Public Works), ms., 8-6-1859 and 17-6-1859, DGCAM RC 36, AHMOPC.
- ¹⁰⁸ Bill of law 15-5-1867.
- ¹⁰⁹ Arts. 1 and 2, decree 22-8-1867. Surface measure were throughly regulated by ordinance, 17-12-1867.
- ¹¹⁰ Ordinance executing art. 1 of decree 22-8-1867 (volume and capacity measures), 13-5-1868.
- ¹¹¹ Decree 17-9-1868.
- ¹¹² Decree 17-9-1868, preamble.
- ¹¹³ Decree 24-4-1869.
- ¹¹⁴ Decree 27-11-1869.
- ¹¹⁵ Ministerial ordinance 5-7-1870. For information on Lisbon and Porto, see art. 1.
- ¹¹⁶ Gaspar Correia Fino, coord., *Legislação e disposições regulamentares sobre o serviço de pesos e Medidas coordenada por...*, Lisbon, Imprensa Nacional, 1884. However, one other collection does not register this proposal, vd. J. de Oliveira Simões, *Serviço metrológico. Legislação e disposições regulamentares coligidas e anotadas...*, Lisbon, Tip. do Anuário Comercial, 1917. The proposed bill indicates surface measures were already enforced.
- ¹¹⁷ Bill 8-2-1871.
- ¹¹⁸ *Revolução de Setembro*, 19-6-1861.
- ¹¹⁹ Lisbon Prefect to General Department of Civilian Administration/Interior, ms., 21-6-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 661.
- ¹²⁰ Public works/Head Office to General Department of Civilian Administration/Interior, ms., 22-6-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 661.
- ¹²¹ *Diário de Lisboa*, n. 145, 3-7-1861.
- ¹²² *Revolução de Setembro*, 2-7-1861.
- ¹²³ Lisbon Prefect to General Department of Civilian Administration/Interior, ms., 2.7.1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 731.
- ¹²⁴ *Revolução de Setembro*, 4-7-1861.
- ¹²⁵ General Department of Civilian Administration/Interior to all prefects, ms., n. 315, 10-7-1861, IANTT/MR/DGAC/3ª Rep.
- ¹²⁶ *Comércio do Porto*, 16-7-1861, p. 2.
- ¹²⁷ *Revolução de Setembro*, 19-7-1861, p. 3.
- ¹²⁸ *Revolução de Setembro*, 28-7-1861, p. 3.
- ¹²⁹ *Comércio do Porto*, 12-7-1861, p. 1.
- ¹³⁰ *Comércio do Porto*, 19-7-1861, p. 2 and *Comércio do Porto*, 8-8-1861, p. 1.
- ¹³¹ Porto prefect to Interior, ms., 13-8-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹³² General Office/Public Works to Department of Weights and Measures, ms., 30-10-1861, MOPCI RC 13 (2), AHMOP.
- ¹³³ Ministerial ordinance to the prefects of Porto, Braga and Viana, 16-12-1861.
- ¹³⁴ Beja head of district public works to Fradesso da Silveira, ms., 4-9-1861 in minister Public Works to minister Interior, ms., 11-9-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹³⁵ President Municipality Amodôvar to Beja Department of Weights and Measures [copy], ms., 2-9-1861 in minister Public Works to minister Interior, ms., 11-9-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹³⁶ Beja Department of Weights and Measures to Fradesso da Silveira, ms., 4-9-1861 [copy] in minister Public Works to minister Interior, ms., 11-9-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹³⁷ Beja Department of Weights and Measures to Fradesso da Silveira, ms., 4-9-1861 [copy] in minister Public Works to minister Interior, ms., 11-9-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹³⁸ *Revolução de Setembro*, 14-8-1861, pp. 2-3; vd. also *Comércio do Porto*, 17-8-1861, pp. 2-3.
- ¹³⁹ *Revolução de Setembro*, 14-8-1861, pp. 2-3.
- ¹⁴⁰ General Office/Public Works to Department of Weights and Measures, ms., 17-8-1861, MOPCI-RC 13 (2), AHMOP informing with copies official letters from the Lisbon prefect of August, 14, accompanying official letter from Setúbal administrator to Lisbon prefect.
- ¹⁴¹ Sources for this sub-section are constituted mostly by the replies sent by prefects to a circular telegram sent by the Minister of the Interior to all prefects asking to be informed «in detail and comprehensively» on the execution of the new system of weights. See IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁴² Municipal administrator Mangualde to General Department of Civilian Administration/Interior, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.

- ¹⁴³ Municipal administrator Pesqueira to General Department of Civilian Administration/Interior, ms., 15-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁴⁴ Municipal administrator S. Pedro do Sul to General Department of Civilian Administration/Interior, ms., 15-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁴⁵ Municipal administrator Mangualde to General Department of Civilian Administration/Interior, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁴⁶ Braga prefect to General Department of Civilian Administration/Interior, ms., 12-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁴⁷ Bragança prefect to General Department of Civilian Administration/Interior, ms., 13-7-1862, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751; Castelo Branco prefect to DGAC, ms., 15-7-1861, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751; Guarda prefect to DGAC, ms., 10-7-1861, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751; Leiria prefect to DGAC, ms., 10-7-1861, to DAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751; Porto prefect to DGAC, ms., 12-7-1861, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751; Viano do Castelo prefect to DGAC, ms., 10-7-1861, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751; Vila Real prefect to DGAC, ms., 10-7-1861, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751; Viseu prefect to DGAC, ms., 11-7-1861, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁴⁸ Municipal administrator Mangualde to General Department of Civilian Administration/Interior, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁴⁹ Aveiro prefect to General Department of Civilian Administration/Interior, ms., 10-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁵⁰ Viseu prefect to minister of the Interior, ms., =confidential=, 2-8-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁵¹ Beja prefect to General Department of Civilian Administration/Interior, ms., 10-7-1861, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁵² Municipal administrator Tondela to General Department of Civilian Administration/Interior, 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁵³ Municipal administrator Pesqueira to General Department of Civilian Administration/Interior, 15-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁵⁴ Viana do Castelo prefect to General Department of Civilian Administration/Interior, ms., 10-7-1861, to DGAC, ms., 11-7-1861, IANTT/MR/DGAC/3ª Rep/Liv. 19/mc. 3082/n. 751.
- ¹⁵⁵ Department of Weights and Measures to minister Public Works, ms., 20-9-1861, n. 875, RPM 4 (1), AHMOP.
- ¹⁵⁶ Department of Weights and Measures to minister Public Works, doc. cit., 20-9-1861.
- ¹⁵⁷ The inspective service of weights and measures was charged to municipalities by § 4º, art. 249 of the Administrative Code of 1842; by § 9, art. 120 of said Code, municipalities were also charged with everything concerning municipal policing.
- ¹⁵⁸ Department of Weights and Measures to minister Public Works, ms., 25-11-1861, RPM 4 (1), AHMOP.
- ¹⁵⁹ Public Works ministerial ordinance 28-11-1861 to prefects of Guarda and Castelo Branco.
- ¹⁶⁰ Department of Weights and Measures to minister Public Works, ms., 27-11-1861, RPM 4 (1), AHMOP.
- ¹⁶¹ Department of Weights and Measures to minister Public Works, doc. cit., 27-11-1861.
- ¹⁶² Department of Weights and Measures to minister Public Works, ms., 8-1-1862, =extremely urgent=, RPM 4 (2), AHMOP; DWM to Lisbon prefect, ms., 9-1-1862, =extremely urgent=, RPM 4 (2), AHMOP.
- ¹⁶³ Department of Weights and Measures to minister Public Works, ms., 31-5-1862, RPM 4 (2), AHMOP.
- ¹⁶⁴ Department of Weights and Measures to minister Public Works, ms., 24-7-1862, RPM 4 (2), AHMOP.
- ¹⁶⁵ Department of Weights and Measures to minister Public Works, ms., 28-6-1862, RPM 4 (2), AHMOP.
- ¹⁶⁶ Department of Weights and Measures to Santarém prefect, ms., 7-9-1863 [copy]; DWM to municipal administrator Aldeia Galega, ms., 10-9-1863 [copy]; DWM to municipal administrator Alcochete, ms., 10-9-1863 [copy]; DWM to municipal administrator Almada, ms., 10-9-1863 [copy]; in DWM to Duque of Loulé (minister Public Works and Prime Minister), ms., 10-9-1863, RPM 4 (2), AHMOP.
- ¹⁶⁷ Department of Weights and Measures to Loulé (minister Public Works and Prime Minister), ms., 10-9-1863, RPM 4 (2), AHMOP.
- ¹⁶⁸ Department of Weights and Measures to Loulé (minister Public Works and Prime Minister), ms., 10-9-1863, RPM 4 (2), AHMOP.

- ¹⁶⁹ Department of Weights and Measures to Lisbon prefect, ms., 10-9-1863, RPM 4 (2), AHMOP.
- ¹⁷⁰ General Office/Public Works to Fradesso da Silveira, ms., 18-9-1863, =confidential=, AHMOPCI/MOPCI RC 13 – 2 (my emphasis).
- ¹⁷¹ Central Board of Weights and Measures to Santarém prefect, ms., 12-10-1863, = confidential=, RPM 6 in TGEPM-RPM 4, AHMOP (my emphasis).
- ¹⁷² Miguel Cunha, «Relatório de fiscalização do serviço de pesos e medidas em Alcácer, Grândola e S. Tiago do Cacém», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xi, 1861, pp. 428-431, here pp. 428-429, quote p. 429.
- ¹⁷³ Cunha, «Relatório...», op. cit., 1861, p. 429.
- ¹⁷⁴ Cunha, «Relatório...», op. cit., 1861, p. 430.
- ¹⁷⁵ Fradesso da Silveira to district directors of Public Works, ms., =confidential=, 27-6-1861, *Livro de registo dos officios confidenciais expedidos*, RPM6 in TGEPM-RPM4, AHMOP.
- ¹⁷⁶ Fradesso da Silveira to president Abrantes municipality, ms., =confidential=, 4-7-1861, *Livro de registo dos officios confidenciais expedidos*, RPM6 in TGEPM-RPM4, AHMOP.
- ¹⁷⁷ Joaquim Graça, «Relatorio sobre a fiscalisação do serviço de pesos e medidas no districto de Lisboa», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. x, 1861, pp. 289-293, quote pp. 292-293.
- ¹⁷⁸ Fradesso da Silveira to minister Public Works, 5-9-1861, *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. X, 1861, p. 295.
- ¹⁷⁹ Fradesso da Silveira to minister Public Works, ms., 1-8-1861, =confidential=, *Livro de registo dos officios confidenciais expedidos*, RPM6 in TGEPM-RPM4, AHMOP.
- ¹⁸⁰ Fradesso da Silveira to minister Public Works, 17-9-1861, *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol x, 1861, pp. 298-299, quote p. 299.
- ¹⁸¹ Ricardo Ferraz, «Relatorio sobre o serviço de pesos e medidas no districto de Ponta Delgada», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. x, 1861, p. 298.
- ¹⁸² Fernando Albuquerque, «Relatorio sobre a fiscalisação do serviço de pesos e medidas no districto de Leiria», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. x, 1861, pp. 299-303, quote p. 301.
- ¹⁸³ Albuquerque, «Relatório...», op. cit., 1861, quote p. 301.
- ¹⁸⁴ Cunha, «Relatório...», op. cit., 1861, quote p. 429.
- ¹⁸⁵ James C. Scott, 1990, *Domination and the arts of resistance*, New Haven, Yale University Press, 1990, pp. 13-15.
- ¹⁸⁶ Luiz Lecocq, «Relatorio sobre a fiscalisação do serviço de pesos e medidas no districto de Portalegre», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xiii, 1861, pp. 549-553, here p. 549.
- ¹⁸⁷ Lecocq, «Relatório...», op. cit., 1861, quote p. 552.
- ¹⁸⁸ Cunha, «Relatório...», op. cit., 1861, here p. 431.
- ¹⁸⁹ Francisco Moya, «Relatorio sobre a fiscalisação do serviço de pesos e medidas no districto de Lisboa», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. x, 1861, pp. 295-297, quote p. 296.
- ¹⁹⁰ Manuel Pereira, «Relatorio sobre a fiscalisação do serviço de pesos e medidas no districto de Castelo Branco», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. xiii, 1861, pp. 561-567, here p. 562.
- ¹⁹¹ Cunha, «Relatório...», op. cit., 1861, quote p. 429.
- ¹⁹² Moya, «Relatório...», op. cit., 1861, here p. 296.
- ¹⁹³ Afonso Soares, «Relatorio sobre a fiscalisação do serviço de pesos e medidas no districto de Angra», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, vol. x, 1861, pp. 294-295, quote p. 294 (our emphasis).
- ¹⁹⁴ Cunha, «Relatório...», op. cit., 1861, quote p. 431.
- ¹⁹⁵ So much so, the Department pressed the ordinance to consider illegal the simple possession of old standards, put to practice by ministerial ordinance of Ministry of Justice 6-7-1863 in *Diário de Lisboa*, n. 127, 9-7-1863.
- ¹⁹⁶ *Revolução de Setembro*, 16-7-1861, p. 2.

Counting people in

The first Portuguese «modern census» of 1864

*La statistique est le budget des choses
et sans budget point de salut public.*

Napoleon Bonaparte¹

The Portuguese liberal model

Portuguese liberalism shared in the «praise of Statistics as a rigorous, quantitative and mathematical representation of society» and concurrently regarded it as the indispensable basis of good governance.² The collection of statistical elements would contribute to the «resolution of economic problems, and to enlighten legislators in the making of the laws that depend in some degree on the general findings of statistics».³ Specifically, liberal governments concerned themselves with the cadastre of the population, which illuminated four crucial areas of government. All based on the registry were the calculations of the annual movement of the population, of electoral registration, military registration (the basis for recruitment and the distribution of the forces), and the apportioning of land-based taxes. These incumbencies were shared amongst the ministries of Interior, War and Finance.

Ever since Mouzinho da Silveira, the spirit of the core administrative legislation was one of placing the responsibility for the compilation of statistical data upon the representatives of executive power in the various levels of territorial administration.⁴ The prefecture was to organize and unify the information collected by the municipal administrator.⁵ The general ordinance of 20-10-1835 launches, through the prefectures, the census-taking, as an inquiry into the condition and movement of the population.

Although this ordinance came to no practical effect, it defined a model that would be progressively reaffirmed in the years to follow. The parish commissars were to fill out the civil parish population registry, having the collaboration of the parish priests who were to provide them with the base data on the population's movement (ordinance 5-5-1837). These maps would then be remitted to the municipal administrator, who compiled them and sent them, at a given time of the year, to the prefect. Having verified the data, the latter would then collect the information for the various municipalities in the district, and send the whole of the documentation on to the office of the Secretary of the Interior, by March of each year. The data would, finally, be sent to the Statistic Board.⁶

The important thing to keep in mind about the 1834-1849 period is that, though the political struggle consumed most political activity in the early years of the liberal regime, though the state was minute in size, and its territorial incidence extremely limited, and though, for that very reason, the administrative chain responsible for statistic works (prefect, municipal administrator, parish commissar) failed to work for quite some time; in spite of all this, an effective effort to collect information was made, which is apparent, namely, in the taking of censuses, of which the most complete will be that of 1849.⁷

The issue of (civil) registration

The principle of a civil registry was established in 1832, by art. 69 of the decree n. 23 of May 16, as «the general enrolment of all the citizens through which the public authority sanctions and legitimises the principal times in the civilian life of individuals, to wit: births, marriages, and obits», and the municipal purveyor was charged with its keeping. In 1835, by decree of July 18, the execution of the former was made dependent on a

special regulation, which never came to be. The 1836 Administrative Code also provided for the civil registry (arts. 131 and 132), but, as the necessary regulations were not published, it was ordained that it remain a charge of priests, just as the closed archives should remain in their charge, at the parishes.⁸ In article n. 255, the 1842 Administrative Code establishes the municipal administrator as an official of the civil registry, and notes that a special provision shall regulate his attributions in this matter. That provision was never issued. Although voluntary civil marriage was provided for in the Civil Code of 1867 (art. 2457), it was never regulated. Only in 1878, and under the pressure of a strong campaign led by republican intellectuals, did the government institute the possibility for citizens to opt for the civil registration of birth, marriage, and obit.⁹ The civil registry, understandably included in the republican program, was not made compulsory and universal until 1911, by decree of February 18.¹⁰

In the pyramid of information on the population the state was attempting to set up, the collection of basic data was assigned to parish commissars. Although the will existed to break the ecclesiastical administration's monopoly on the registration of marriages, births and deaths, the absence of regulation kept the Church in control of what basic documentation there was. In practice, as Espinha da Silveira notes, «the state could not dispense with the participation of parish priests in the elaboration of population statistics, especially since it did not have at its disposal the qualified human means to collect the data: in many areas, clergymen were the only people capable of filling out the forms for the parishes statistics. In practice, the commissars merely signed on to the documents elaborated by the parish priests, confirming the validity of the data».¹¹

The parochial registry reigned in Portugal, nearly unaltered, until 1859. Contemporary criticism was widespread. Oliveira Marreca, evaluating the censuses of

1838, 1841, 1843, 1849 e 1850, considers that «the documents are scarcely worthy of trust».¹² Why? The problems begin at birth: «it is natural there should be gaps, due mainly to neglect in our parochial registries». But aside from that, beyond negligence, in both births and deaths: the unbaptized, those belonging to a different cult, those dead at birth, were omitted, the exposed redoubled, and so on.¹³ Or, as José de Torres writes: «The civil registry in the hands of the parish priests, no matter how great the zeal they put into preserving it, may, at the most, consign the facts of birth and marriage of those individuals included among the hosts of the state religion, and who seek out its ministers for the sacraments of baptism and matrimony; it might, at the most, consign the fact of those buried in the public places of rest with the priest's assistance. But, what of the stillborns? What of those who die without the sacrament of baptism? What of those who live on unbaptized? What of those who pass away and are not religiously interred? What of those who are of another religious communion and that have no need, for baptism, for marriage and for burial, of the Portuguese priest's intervention?»¹⁴

On August 19, 1859, the government tried to placate some of these criticisms, not by instituting the civil registry, but by attempting to improve upon the parochial one. To this end, it sought to make uniform the different registers of the various dioceses (the ordinance of October 8 published the models to be followed). Finally, in 1862, a decree dated April 2nd ordered the 1859 decree to be enacted in the continent and the adjacent isles.¹⁵ Apparently, none of these measures improved the situation, and the complaining proceeded.

The issue was, precisely, that of the priests' zeal, in particular, and that of the ecclesiastic structures' intervention in the execution of functions properly belonging to the civil administration, in general. The complaints described by Espinha da Silveira for the 1840's continue to be heard all through the 1850's and 60's.¹⁶ The prefects not only

demand the setting up of the civil registry, invoking the need to regulate art. 255 of the 1842 administrative code, but they mercilessly enumerate the roll of flaws of the civil registry as charged to the parish priests. In the prefects' eyes, the parish priests, possessed of «no quality whatsoever that oversees their obligations in that respect, they do not generally employ in their execution the care the matter deserves, so that books with large gaps, miscellaneous notes yet to be compiled, and other such irregularities, are not scarcely found».¹⁷ There were parishes in which baptisms went unrecorded, others in which the books were mutilated or truncated (according to an evaluation made by the bishop of Lamego himself¹⁸), and others still in which they were counterfeit.¹⁹

The relationships with the trickery and corruption brought on by the military enrolment are widely acknowledged. In Leiria, baptismal records were inscribed with «the greatest irregularity». Different records were opened for the same young man, according to convenience, and one might even witness «the sad spectacle of a priest's suit, indicted for having corrupted the baptismal records, by altering to female names those of young men subject to recruitment».²⁰ Guarda's prefect was remarkably candid: «there are books in which the baptismal records for several years are missing, and some have been found corrupted: the information given by parish priests and commissars is not always the expression of truth; how often will the truth be superseded by particular affections, or even interests? And yet it is those records, and that information, that must serve as the basis for the censuses? – One can see, thusly, how difficult it is that they shall be perfect and done with that exactitude, and impartiality, that one would desire».²¹

Let me stress this issue's political and ideological overtones. At stake in the matter of civil registry is the secular character of the state, the independence, not only in law, but in practice, between Church and State. In the wider context of the «re-

evangelization» of Europe during the papacy of Pius IX, the emerging republican movement argued that the compelling force of Catholicism was a product of its cultural power, which was reproduced and socialized, not just through prayer and teaching, but also through the command of the symbolic and administrative means to certify birth, marriage and death. Hence, the separation of church and state required the institution of civil registration, as a compulsory, rather than simply optional or subsidiary, mechanism. By doing so, the state not only recovered the «material» and «functional» control of the population movement, but also – Fernando Catroga points out – confiscated and subordinated the «religious expression of rites of passage to its essential civic dimension».²²

Attrition and state machinery in the decades of 1830 and 1840

In his study, Espinha da Silveira devotes an entire section to the hardships the Ministry of the Interior was faced with in putting annual population censuses into practice; hardships which explain why, until the late 1840's, annual censuses dragged their feet. The author distinguishes between the encumbrances provoked by the insufficient efficacy of the state's peripheral administration and those caused by the intervention, in relevant functions, of the parochial clergy.

In its expansion, the liberal state's bureaucracy sought to frame in a closer manner the population and the territory, making the state's presence a common fact in the life of local communities, in contrast to the previous central power, far more remote and intermittent. The state tried to endow itself with an apparatus that blanketed the whole of the territory, so as to have a direct relationship with the citizenry, dispensing, at least theoretically, with the other social powers as intermediaries. Those powers, amongst which the church and the municipalities, watched their functional place

evaporate, and with it, their power and status. Faced with the confiscation by the state power of those functions that elected them as relevant partners for social negotiation, these powers either resisted, or colonized the new structures, or both.

As it happened, however, not only did the central power lack the necessary resources to create those structures²³ once and for all, but there was also not enough qualified staff to occupy all of those positions. Thus, as the case of population statistics evinces, the state administration, through its peripheral apparatus, made use of the church's «services», «farming out» those tasks which, no matter how strident the rhetoric to the contrary, it could not, or would not, carry out on its own. The relationship between church and state must be understood as one of «contractualization» and competition/cooperation.²⁴

Extending state administration to the parish upset the usual forms of parish self-government and threatened the priests' position. The attempt to create the civil registry was, precisely, a notorious instance of this issue. The abolition of tithes, in 1832, aside from the question of the churches' subsistence, brought on a change in the clergy's social status, for it no longer earned its own income, and was henceforth, with the *côngruas* system, an employee of the state. All of this contributed to the environment of friction between public and ecclesiastic administration, which is at all moments made visible in the census documentation.²⁵

But it was in the district administration itself that the problems began: there was no staff able to carry out the statistics, or it was too small in numbers, there was work overload, and lack of zeal, insufficient commitment and scarce ability; complaints that applied also to parish commissars and parish priests. Parish priests, especially, were the objects of endless complaints: ignorance, inability and carelessness. Such complaints are indications of the friction between the civil administration and the religious. These

problems were compounded by doubts concerning the legislation in force, having to do with how to fill out the maps, and with the years they referred to.²⁶

In sharp contrast to this dismal panorama, the 1849 census is quite thorough and it is carried out in a few months. Silveira looks upon this as a sign that the work done thus far was beginning to pay dividends, and as a symptom of the administration's increase in efficiency, as proven by the censuses of 1850 and 1851²⁷, also rather complete, by the elaboration of a detailed inventory of state patrimony in 1847-51, and by the publication in 1850 of a census of the inactive classes.²⁸ In short, and concerning the 1834-51 period, Silveira's work corrects the existing notion, which has its remote roots in Oliveira Marreca and Charles Vogel, and its modern formulation in Joel Serrão, then echoed by Fernando de Sousa, that there would have been a «clear setback in all that concerns the counting of people».²⁹ Marreca and Vogel make essentially the same point, according to which, in the latter's words, «the absence of any guarantee for the exactitude of evaluations preceding the 1851 census, and the uncertainties that likewise riddle those of the following years, do not allow us to determine what might have been, in the last 25 to 30 years, the true growth of Portugal's population, nor even to positively claim that it grew, no matter how little doubt there seems to be on this subject».³⁰ Espinha da Silveira, aware of the enormous difficulties, shows why one cannot speak of «retreat», but, rather, of the slow and difficult affirmation of statistical collection as a routine administrative practice. The well-documented hardships were a sign of just that. After all, friction is what characterizes movement.

The institutional context of the 1864 census

Benefiting from an unheard of political stability, the regime that came out of the military coup of April 1851, the so-called «Regeneration», fostered the country's

economic development and the creation of communication infra-structures: roads, railways and waterways.³¹ Over the years, the successive governments struggled with the widespread lack of statistical information with which to plan the material improvement they were preparing:

«No government desiring public happiness may dispense with the examination of the nation's physical and moral conditions, industry, needs and resources, for from the knowledge of those conditions depends in great measure the adjustment of those laws that must promote the accretion of wealth, and remove the obstacles which stand in the way of the peoples' progress and well-being. Without the aid of statistics, which, by methodically gathering and classifying the documents which are the object of an important branch of governmental science, succours the public powers in discovering how far they must go, or what limit to impose themselves, it will be difficult if not impossible to legislate with any hope of reaching the fair and decorous end the laws seek.»³²

Regarding the production of statistical information, there were, at the mid-century, several instances of overlap and ambiguity among the various governmental departments. The ministries of War, Interior and Ecclesiastic Affairs and Justice shoddily and incipiently got in the way of each other's tasks. To Fernando de Sousa, the results of this «bureaucratic resolve» were «mismatched». In the course of the second half of the century, statistics would become «a public activity, as it had happened in several European states, the period of good intentions and amateurship left behind».³³ The primordial goal, simple in appearance alone, was that of turning statistics, along with cartography and weights and measures, into a routine public activity, comparable to tax collection or the maintenance of a standing army.

The reform which organized and regulated the Ministry of Public Works, Commerce, and Industry created in each of the Departments of the General Department of Commerce and Industry a statistics section: agricultural statistics, commercial statistics, and industrial statistics.³⁴ The next step was the decree of 8-8-1857, which, in

line with the recommendations of the Paris statistical congress of 1855³⁵, created the «Central Board of Statistics», within Public Works, with the goal of «organizing the general statistical plan for all branches of public administration, superintending the execution of that plan and centralizing the publication of statistical results».³⁶ With the reorganization of Public Works, resulting from the authorization given in the law of July 6, 1859, the Central Board was transformed into the Statistics Department, becoming an orderly and regular public service. The eminently ephemeral «Board» was extinguished, in favour of a more stable model, which could no longer be undone by simple executive order, as had been the board's case. The transition to the Department format signals an increased institutional sedimentation, but also, as in the case of cartography and weights and measures, prepares the transition from an essentially advisory profile to an executive one. An integral part of the General Department of Commerce and Industry, the Statistics Department was charged with the task of «collecting and centralizing statistical facts, organizing the models, giving the necessary instructions to the various subordinate agents working in this branch of service, comparing the primordial data, correcting them through analysis and counterproof, and finally, elaborating and publishing the general statistical maps whose results are as useful for the resolution of economic and administrative problems, as for the demonstration of many a social truth.»³⁷ José de Torres, a civil engineer, was appointed to direct it.³⁸

The strong idea behind the Department's creation was that of making effective the principles of statistical «centralization», «unity», and «uniformity» In fact, those same overlaps and ambiguities which Sousa noted for the preceding period were ongoing in the 1850's – and this is what the state sought to do away with. In 1857, for instance, the Ministry of Ecclesiastic Affairs and Justice had attempted to carry out a

general inquiry into the state of the parishes, including the population's movement, property values, taxes paid, and elementary and secondary education.³⁹ Such decisiveness may be explained by the minister's personal resolve: António José de Ávila was the author of the 1847 *Report on the Cadastre*, and, more to the point, the Portuguese delegate to the Brussels (1853) and Paris (1855) sessions of the International Congress of Statistics. Ávila did not attend the Vienna (1857) and London (1860) sessions, precisely because he was the minister of Justice, and then Finance and Foreign Affairs.⁴⁰ In 1860, Ávila, using the knowledge he had acquired, presented the result of the 1857 statistical inquiry of parishes, in maps sorted by municipalities. According to Sousa, «these maps mark the line of transition that will culminate in the 1864 census. They included the total number of parishes, residences, souls, baptisms (legitimate and illegitimate), marriages (sorted by age, religious status, occupation, and birthplace) obits (by age, sex, occupation) and also the total numbers of orphans».⁴¹

The International Congresses of Statistics

Samuel Brown, the English representative to the Florence session (1867) of the International Congress of Statistics, pointedly expressed the scope and goals of the Congress: «Even if these statistical congresses had no other subject than to bring together thoughtful men with the same pursuits, combining their experience, and knowing where to look for mutual aid or special knowledge in any particular inquiry, they would effect a vast amount of good by laying down a broad and uniform, instead of an individual and narrow, basis of research in each question.»⁴²

The International Congress of Statistics was first convened in 1853, in Brussels, under the auspices of Quételet. Portugal sent António José de Ávila as official delegate.⁴³ The Congress' main goal was to introduce unity in the official statistics published by the various governments, thereby making their results comparable. As the

starting point, the introduction of conceptual unity, with the aim of adopting, «after careful examination, the same names and the same figures to represent the same objects.»⁴⁴ In addition, the congress sought the adoption of uniform foundations for statistic operations at the level, for instance, of institutional design, procedures, forms and documents, presentation of information and type of sorting. The Brussels Congress concluded that the safest method of achieving the desired uniformity would be to create, in each state, a central statistics board. This resolution would again be confirmed in the sessions in Berlin (1863), which explicitly reaffirms Brussels⁴⁵, and Florence (1867).⁴⁶

And, if the goal was to make comparable, through the publication of statistics, the realities of each countries' economic policy, no one aspect of reality was more important than that of population itself: «The first and most important subject is that of population, because all the comparisons of the state and progress of one country with another must be made dependant upon the relative population of each.»⁴⁷ On the specific matter of censuses, the Brussels session agreed on the convenience of making them nominal and based on the principle of the *de facto* population (special enquiries could be held in order to establish the legal population). The censuses should be decennial, carried out in the month of December, and make use of a family bulletin. Special agents, in charge of distributing the bulletins, were to ensure that these were properly filled out, or to fill them out themselves. The censuses should comprise: name and forenames; age; birthplace; spoken language; religion; marital status; profession or status; place of residence, permanent, usual, temporary or momentary; children receiving public or private education; distribution of houses by age and by number of rooms used for the residence of each family; apparent illnesses and infirmities, including the blind, deaf-mutes, alienated persons at home and at public establishments, idiots.⁴⁸

The following session of the Congress, held in Paris, in 1855, at which Ávila was again present, recommended once more, concerning the organization of statistics, that each state institute a central statistics board, composed of representatives of the main branches of public administration. At the Berlin session, in 1863, Ávila began by presenting to the congress a report on the progresses of Portuguese statistics.⁴⁹ Therein, he attempts to show that the course of action taken by the government sought to follow closely the Congress' recommendations. Ávila announces, namely, that there had been, since 1857, a notion of creating a central statistics committee, «according to the will of the Paris congress, an attempt which was not successful, as the minister, who had created this committee, left power before it was fully appointed» and that, in 1859, at last, a «special bureau of statistics» had been created.⁵⁰

It is thus apparent that the institutional development of the Portuguese statistical apparatus was shaped by the recommendations of the International Congress, and that the Portuguese representative made it a point to make this fact known in his report to the Congress. However, the effects of these recommendations reached farther than the institutional model. As we shall note in detail further on, that same influence was evident in the main characteristics of the Portuguese census of 1864, and the same care was taken to inform the Congress on which points of doctrine were followed or not, and why.

But there was more to the Congress than censuses. We should recall the wide scope of matters on which the Congress proposed lines of policy to be adopted by each of the countries: demographic censuses, cadastre, emigration, cattle censuses, industrial statistics, commercial statistics, livelihood standards of the working classes, orphans and indigents, statistics on instruction and education, and criminal statistics. In fact, in 1863, the initiatives concerning the census, although presented first, were considered on

equal footing with others, such as the creation and operation of a statistical bureau in the army, or other types of initiatives, such as the sending of publications to similar bureaus. This might seem surprising insofar the Portuguese state held the census highest in its hierarchy of priorities, but it was not so in the wider and more eclectic context of the Congress' aims. From the standpoint of the Congress, it was important to steadily follow the agenda of activities and the list of reforms to be adopted. This circumspect assembly of gentlemen academic and political discussed all matters in the intervals between an official reception, a royal banquet and an outing to the opera.⁵¹ Portugal was obliged to either put into practice some of the measures proposed by the Congress or stop sending a representative, out of embarrassment and humiliation. As Ávila puts it in the Berlin session report: «It would be futile to demonstrate, that it is in our highest interest and utmost convenience to take those resolutions in due consideration. Were it not to that end it would be useless, for Portugal to be represented in such assemblies, and the position of its envoy in future congresses should be most difficult, were he not able to demonstrate through fact, that the statistical inquiries also make progress in this kingdom, and that the government makes good use of the advice and work of those same assemblies.»⁵² Ávila's discomfort is understandable. It was, indeed, undignified, however inexact, to read in the summary by country included in the 1863 *compte-rendu* only the following, under the heading «Portugal»: «The Portuguese government, proceeding with the organization of statistics, published a Bulletin of the Public Works Ministry.»⁵³

It might be useful, at this stage, to briefly sum up the situation concerning the execution of population censuses up to 1864, focusing on countries participating in the Congress, namely France, Spain, Italy, Great-Britain, Prussia and the United States of America. In France, the first census took place in 1801, the second in 1805. The

censuses were then repeated, at five year intervals, in 1820, 1831, 1836, 1841, 1846, 1851, 1856 e 1861.⁵⁴ In Spain, the first general census was held in 1857, and then repeated and confirmed in 1860; the next census that I now of was that of 31-12-1877.⁵⁵ The infant kingdom of Italy enumerated its population in 1861.⁵⁶ Great Britain truly was the pioneer in population census. The first proposal for a general census dates back to 1753, and the first one was completed in 1801; from then on, they occurred at ten-year intervals.⁵⁷ Prussia had triennial censuses from 1816, as did other states of the Zollverein.⁵⁸ In the United States, the first census harks back to 1790; one was held every ten years from then on.⁵⁹ We should add only Belgium, since its example is constantly invoked in comparison to Portugal. From the time of its independence in 1830, Belgium held two general censuses in 1846 and 1856, and then again in 1876 e 1880.⁶⁰

Attrition and state machinery in the decades of 1850 and 1860

Before going into the study of the definition and execution of the December 31, 1863 census, I will attempt to reconstruct the way in which the administrative structure charged with gathering information on the population (prefect, municipal administrator and parish commissar) operated and the major hindrances it faced. We shall see how the taking of a general census of the population appeared, in the face of these difficulties, as a possible solution. To that effect, we will make use of the annual reports by the prefects, in the period between 1856 (when the publication of those reports began) and 1868 (date the 1864 census was published).⁶¹ It is important to point out that reports were drafted from the prefect's viewpoint, this fact being decisive to their interpretation as sources. They betray the worries, difficulties and obsessions of a peripheral administration obliged to act with limited resources, with staff not qualified enough, in

an environment of competition with alternative social powers, such as municipal councils and the church; an administration troubled, especially at the municipal level, by a structural ambiguity: if it can be truly said that the municipal administrator was the political commissar of the central power with the municipalities, it is no less true that he was the representative of the peripheral powers before the state administration. Standing at the watershed between central and local, he was the decisive broker in the state's peripheral administration.

When compared with the image given by Espinha da Silveira for the period from the mid 1830's to the end of the 1840's⁶², the panorama for the decades of 1850 and 1860 is not much changed – which is, in itself, telling. But telling of what? We believe it speaks of an essential trait of the development of the Liberal state, that of contractualization, particularly evident in the execution by the peripheral administration of those policies which required the territorial framing of territory and population.

The issue which is perhaps most profusely illustrated in the reports is that of the poor quality of the census carried out annually by Interior. The statistical information thus collected, and then used to compute the annual movement of the population, was poor because it was the object of manipulation, carelessness and even fraud. In practice, census operations were overseen by municipal administrators, who could delegate them to the parish commissars.⁶³ As it happened, the administrators did not fully commit their efforts to statistics «either because they do not possess the indispensable technical knowledge, or because they are overloaded with tasks, or because they are not properly aided by their Controller and by the Parish Commissars» (*Relatórios*, Coimbra, 1857: 41). From this set of circumstances, Coimbra's prefect surmised that «statistics are far from being the faithful and true expression of facts, and that not a few times they fail to be submitted to this prefecture within the set deadline» (*Relatórios*, Coimbra, 1857: 41).

The poor quality of population statistics and their endemic tardiness prevented a clear perception of the true existence of phenomena, raising interpretative issues which were reflected in doubts in the orientation of public policies.

Concerning administrators' qualifications, Silveira e Sousa shows that «the situation, though far from brilliant, given the technical character and vast duties these state employees accumulated, was not as dire as it often appears in descriptions».⁶⁴ Taking, for example, the year 1854, «in a universe of 366 municipalities and borough administrations in Lisbon and Porto, there were 100 administrators with a bachelor's degree in Law, that is 27%». The national total of graduates was 111, or 30% of administrators.⁶⁵ If it proved difficult to attract qualified people to these jobs, this was not the most dramatic of such cases. The parish commissar, we should recall, earned no salary or bonus, having only the benefit of legal emoluments and exemption from municipal levies.⁶⁶ In most municipalities, the number of those who could read and write or who were truly apt to hold office as president of the municipal council, alderman, local tax official, municipal administrator, municipal controller, parish commissar or controller of the municipal administrator's office was scarce.⁶⁷ Such scarcity resulted in accumulations, and the multiple activity of these employees resulted in a high potential both for conflicts of interest and for the retailing of those same interests. The prefect of Castelo Branco is unequivocal:

«I mention the number of those eligible for the municipal or parochial offices, and that of those listed in the roll of those apt for the office of municipal administrator; if by the schooling credentials of the latter we measure the instruction of those, we will once more come to recognize how astonishing the lag in public instruction, and how in most municipalities there are not persons in the required number, truly qualified for any of those offices; this is why it happens that many individuals hold many offices, and some of them incompatible, and finally it is why so many of those offices are occupied by wholly unable and incapable persons, who instead of being kept from them by the competent Authority, are actually encouraged by that

authority to occupy them, in the absence of those who could properly occupy them.» (*Relatórios*, Castelo Branco, 1857: 4)

Thus, the reason for statistics' poor quality must surely be sought in the deficiencies in the peripheral administration's operations and in the lack of qualifications of its employees; but this is not all. Just as in the 1840's, in the 50's and 60's the commissars merely signed the documents elaborated by parish priests, vouching for their validity.⁶⁸ In many areas, especially in rural ones, priests were still the only people able to read, understand, and fill out the statistical forms for the parish. It was parish priests and the ecclesiastic administration, and not, we should stress, the state's civil administration, who controlled the collection of statistical base information on the population.⁶⁹ In the state administration's view, the priests presented the double disadvantage of not answering to the same power, being thereby immune to the sorts of compulsion and accountability an administrative magistrate was subject to, and of being, in themselves, the target of «pleas», «good words» and «entreaties» of the most varied sort. This problem contained another, for municipal administrators were also the pivot of clientele dynamics with the potential to clash with those of the parish priests. It is not, therefore, at all strange that prefects, on the one hand, address them in a harsh manner:

«In one parish, it is officially known in this prefecture, that some years passed when the proper notices of birth and obit went unwritten. In another, a short while ago, the books were rendered useless, consumed by fire » (*Relatórios*, Beja, 1863: 9)

And, on the other, incessantly clamour for the institution of the civil registry:

The prefect of Guarda asks that the civil registry be regulated, by publishing the regulation mentioned in art. 255 of the administrative code, «for there are parishes in which the baptismal notices are not recorded in their proper book, others in which the books are mutilated and truncated, as was very recently seen in the municipality of Vila Nova de Fozcoa by an examination ordered at my request by His Excellency the Bishop of Lamego» (*Relatórios*, Guarda, 1856: 4)

The poor territorial division was yet another factor vexing the collection of information. Although Liberalism did introduce a modicum of territorial rationality, by reducing the number of municipalities from 816 in 1826 to around 300 in the 1860's, and by doing away with the encroachments that were typical of the *Ancien Regime*, crucial problems remained, namely, the fact that there was not a perfect coincidence between the administrative, judicial, military and ecclesiastic circumscriptions. For instance, a civil parish might contain two ecclesiastic ones, a parish might be created with no civil counterpart, a hamlet might belong to two different parishes, or to one for civil purposes and another for ecclesiastic. The combinations were multiple; the effect was that of «chaos».⁷⁰ Especially serious was the lack of coincidence between the administrative circumscription and the ecclesiastic, at all its levels: «But if the administrative circumscription is badly made, the ecclesiastic, on which it is based, is terrible. One can almost say that there is no parish whose limits are not in need of reform; and as for the superior circumscriptions of vicars, archpriestships and dioceses, it is most urgent they be harmonized with administrative districts, or at least with municipalities.» (*Relatórios*, Santarém, 1857: 4). Concurrently, Bragança's prefect confirms the «disharmony» between administrative and ecclesiastic divisions «is the rule through all the country», «not just between ecclesiastical subdivision and administrative parish, but most markedly between diocese and district». The district in his charge was under the jurisdiction of two prelates, Braga and Bragança, and the bishopric of Bragança cut into the Vila Real district. This inconvenient circumstance, which was as yet unaided by a topographical map to help «round out» the municipalities and parishes, became a problem whenever the exercise of certain public policies was based on the parochial network (*Relatórios*, Bragança, 1858: 3).

The case of military recruitment

Recruitment was another aspect, intimately connected to the census, incessantly referred to in the reports. The law of July 27, 1855, elaborated in a climate of parliamentary cooperation, attempted to launch recruitment in modern terms, fairer and more efficient.⁷¹ According to the plan, operations would begin in February; May would see the lottery; once the deadline for complaints was past, the roll of recruits provided by each municipality to the contingent was completed in September; the recruits requested a certificate from the municipal administrator so they might appear at the prefecture in order to be presented to the revision committee for one last sanitary inspection. At last, those whose recruitment was confirmed were handed over by the prefecture to military authorities.⁷²

In 1856, of the 17 administrative districts of the Continent and Adjacent Isles who turn in a report, 4 point out limitations to the law of 27-7-1855; in 1857, 5 of the 14 who report; in 1858, 13 of the 21 who report. In the face of the piling up of criticism, and in view of the state's incapacity to complete the recruitment⁷³, the law of 4-6-1859, introducing minor changes, revised the 1855 law. To no avail. The following years, the reasons repeatedly invoked for the admitted unavailability of the law both point out specific aspects the law could better regulate, and structural issues that could hardly be reformed or, even, overcome.

Firstly, the stubborn «abhorrence of our people towards military service.» (*Relatórios*, Leiria, 1856: 192). Whilst continuing to hold on to «old prejudices, people generally regard with horror and hold as odious the military service» (*Relatórios*, Guarda, 1857: 4). «The people hate the recruitment! They view in the greatest cold blood the notion of going off to die in those pestilent lands of Brazil, and spare no

sacrifice, avoid no risk in order to escape the ranks of our army!»⁷⁴ The ruses the recruits used included, for instance, mutilation:

«In the parish of Carapinheira [...] the recruits have preferred the mutilation of their right hand thumb to military service! Apparently there is an officious surgeon; the steadiness of the mutilations operation, and suffering, is manifest; and there will be no shortage of mutilators and mutilates as long as this provides exemption from service [§] Youths from that parish have come to inspection, who are tall, robust, well shaped, in whose forms the eyes take pleasure, and grow envious of their shapeliness. And when the revision committee expects to find a recruit the young man triumphantly reveals his thumb, and is found mutilated!» (*Relatórios*, Beja, 1862: 4).

The imperfection of enrolments, for this purpose carried out by the municipal councils, was one obstacle to the recruitment law. We must not forget that, in the face of a panorama of generalized civil resistance, the aim of handing over enrolments to municipalities had been to place them in the hands of an institution «commoners» would trust, as would presumably be the case of the authority they had elected. In this manner, the liability of recruitment would be transferred to a «competing» institution, compromising it and making it responsible for the good keeping of the law. Now, «the municipal councils, to whom this work is assigned, being an elected body, are seldom legally assembled to carry it out, and commonly it is the controller who carries out the registration; the administrators, seeing that municipalities do not assemble, conclude they ought not to be present at the controller's house, and the result is the imperfection of the registration.» (*Relatórios*, Guarda, 1863: 7) Many prefects, in light of these facts, ask that the registration of potential recruits be assigned exclusively to municipal administrators, for they, unlike aldermen and priests, «are trusted employees, and have a responsibility, that can more easily be made accountable.» (*Relatórios*, Guarda, 1863: 7)

The legislator supposed he would find in the municipalities «more assurances of independence and freedom. Unfortunately, however, they failed in this particular of their predictions.» (*Relatórios*, Leiria, 1858: 8) The authorities which had previously been in charge of the recruitment, «although they might be condescending or dispense favours, were not indecorous, for those authorities, were immediately responsible to the government, desiring to keep their position and prosper»; for that reason, «they avoided as much as possible the practice of acts that might lead to censure or destitution». Not so with municipalities. In fact, these same municipalities, following the Additional Act of 1852, had been denied the right to carry out electoral registration, «doubtless because they did not offer sufficient guarantees of justice and impartiality».⁷⁵ The prefect of Leiria perspicaciously remarks: «but the law has charged authorities with overseeing municipalities in their execution of the law, as if those who previously committed certain abuses, would not commit them again, by giving up vigilance.» (*Relatórios*, Leiria, 1858: 8)

Indeed, if municipalities were careless, incompetent and corrupt, administrators were no less so: «It is common knowledge that this authority often shelters refractory recruits from other municipalities, as it happened with the young man from Oliveira de Frades, whom he had and still has in his house as a manservant, taking advantage of this circumstance to enrich himself with the free work of his relative. Accused by us, the municipal administrator of Águeda came before the press declaring on *his word of honour* that his servant was not, nor had he ever been, refractory. Following this declaration by Mr. Joaquim Álvaro, we received a letter in which a gentleman from Oliveira stated, that the youth we mentioned, had excused himself from the armed service the previous day, in the quality of refractory recruit!»⁷⁶ That commissars and

police corporals are the first «protectors» of refractory recruits and that «no one wants to depose against them» is confirmed by Beja's prefect (*Relatórios*, Beja, 1863: 8).

Since recruitment operations were based on the census, and since parish priests were at the base of census operations, occupying a core position in the social life of the towns and villages, their marked protagonism in the reports is not surprising. «[But] who is unaware of the irregular way in which, for the most part, the parochial records are documented, and that priests and commissars are, often, the most interested in subtracting from recruitment many of the youths that are subject to it?» (*Relatórios*, Guarda, 1862: 3) Parish priests and commissars took from their efforts decisive material and symbolic rewards. A municipal administrator might even be deprecated by a peer for the imprisonment of a refractory recruit, «but the parish commissar of that municipality, who takes no profit from a service that compromises him, does not go to the house of his relative or friend to take from him the worker he needs.» (*Relatórios*, «Visitas», Beja, 1868: 6)

The power dynamics at the local level intertwined in the recruitment issue. «The recruits therefore expend their efforts and those of their relatives and friends to escape military service, and there are few so devoid of resources that they cannot find a Commissar, a Priest, a Doctor or a Politician willing to rid them of their trouble» (*Relatórios*, Leiria, 1856: 192). So, doctors, priests, commissars, moved by affection and requests, abundantly provided the documents to certify the requestors' allegations, though these were often false, and municipal councils, out of nepotism, influence, or neglect, gave all of them reason (*Relatórios*, Aveiro, 1856: 8). Together, all these actors put before the law a resistance that was just short of insurmountable.

Bragança's prefect, Castilho e Melo, gave a lucid summary of the issues raised by the recruitment⁷⁷: «I could not help but notice, that patronage, fraud and falsehood,

protected by immorality or tolerated by weakness, ineptitude, and neglect, have nearly always accompanied it, and since the first of its acts.» The registration was done «at the parish priests and commissars' pleasure», and these authorities went on to influence the findings, passing certificates of all sorts. «The office of commissar, generally held by individuals without the least qualification, who care not for the unpaid services demanded of them, exert, to my eyes, the most harmful of influences [...]. As far as parish priests are concerned, in the state of demoralization in which, save for honourable, yet rare, exceptions, the Portuguese clergy finds itself, I believe it is inconvenient to trust to their hands such a powerful instrument of dominion over their parishioners, which they might abuse in large scale through the interference in the acts of recruitment, direct or indirect, which is conferred to them by the law.» The doctors' decisions were «*often made worse through local influences*» (emphasis in the original). Municipal councils, «secure in their impunity», took care to protect «the godchildren of each of the aldermen, who mutually yield for that purpose.» (*Relatórios*, Bragança, 1858: 6-7)

The general population census of 1864

In light of the recommendations made by the International Statistical Congress, and of the assorted injustices, abuses and frauds we have just summarized, the undertaking of a modern population census appeared, in the eyes of both prefects and the government, as the most adequate solution. By «modern census» we mean the «simultaneous collection of demographic information on the population of a certain territory, carried out by the public authority at a certain moment, and repeated at regular intervals of time». The modern census is, thus, distinguished by the following characteristics: simultaneity, generality, periodicity and official nature.⁷⁸

The advisory report of 1861

Undeniably, one important source of inspiration for the December 31, 1863 census was the Advisory Report presented by José de Torres, just six months after he had become director of the Statistics Department (the report was presented in May 1860). In the report, which is explicitly based on the recommendations of the Brussels (1853), Paris (1855) and Vienna (1857) sessions of the Congress, Torres elaborates a plan for the general statistics of the kingdom, presented in the form of an essay, essentially meant to propose and structure future action, divided into five headings: territory, population, industry, administration and colonies.⁷⁹ The Department volunteered the models and instructions needed for the execution of each of those areas.

We should point out that if, on the one hand, the general population census is conceived explicitly as a substitute for the annual census carried out by the Ministry of the Interior, it is also, on the other, part of a generic model of functions attributed to the Statistics Department and, for that reason, it is part of a wider structure, which includes the reform of the civil registry, population movement and the general cadastre of the kingdom. This was, in any case, the notion put forward by the International Statistical Congress, whose resolutions are the admitted inspiration for the report.

Thus, regarding population, the Department states that the general population census is the indispensable starting point, «essential preparation for all statistical observations». It goes on to state that the Department should run the operations, with the «aid of the administrative authorities and special remunerated agents». This method, although in opposition to the doctrine of the Statistical Congresses would be «the only way to carry out the work within the final deadlines, and with the care it requires».⁸⁰ Torres proposes the first census be held on December 30 and 31, 1860, adding that this coincides with the end of a decennial period. In this way, he hoped, Portugal might be

the first country to satisfy the wishes of the Brussels Congress, in its proposal that the first census be held on December 31, 1860.

The annual movement of the population would be a complementary operation to the census, which the Department would also supervise, as it would the registry: «The population registry, by law instituted in our country, is in fact abandoned, and it is imperative that it be revived by simple means and maintained as a reality».⁸¹ The residential bulletins (key element of the general census), would be used to make up in each municipality the basis of the population registry, then completed through «declarations, additions and annexes» to those bulletins, a procedure used already in Belgium, Bavaria, Prussia and Holland. In addition, Torres advocated the creation of the civil registry, which should be instituted by the Civil Code, rather than a mixed situation maintaining the parochial registry and adding on the civil registry for the cases left out by the former.⁸²

The specific fields to be filled by the census are laid down in expanded form in Annex A, including an entire list of «professions or conditions»; the same for the annual population movement. In Annex C, there is a proposed bill for the general census and the population registry. In Annex D, a proposed report and budget bill for the general census and registry; in Annex E, a proposal of legislative and regulatory basis for the establishment of the civil registry. The first remarkable characteristic of the «General Census and Registry of the Population: a proposed bill» is the fact that both are conceived as a set, evincing the interdependence of their relationship. The census would be held at ten year-intervals, and the first would take place on December 30 and 31, 1860. This disposition would banish the practice of taking the population census yearly and by administrative means, as determined by the ordinances of 20-10-1835 and 10-5-1837, by the Interior. Further, it would create population registries in all municipalities.

Taken as a whole, this project removed the responsibility for directing population statistics from the administrative structures and included a strong, implicit criticism of the parochial registry, and of the entire convoluted yearly process of finding the population's movement. According to the proposal for report and budget law, the census should be carried out by paid enumerators, as opposed to the previous model, dependent on the unpaid involvement of the population. The project calculates the number of bulletins, residence and family, required («three million bulletins cannot be budgeted under 10 *contos*»); indicates that, should each enumerator be paid the same amount per person as they were in Belgium (5.5 *réis*), that amount alone would raise the budget to over 20 *contos* (approx. 4 000 000 X \$0055), excluding other complementary expenses, especially those of publishing the general findings. Thus, we come to a total sum of around 30 *contos*. The proposed bill only estimates 20 *contos*, since «there is the hope that we might not have to make such a great sacrifice as there [Belgium], in order to carry out our general census and establish amongst ourselves the population registry.»⁸³

The shaping of the census: decrees and instructions in 1863

It was, then, in this context that the Duke of Loulé's government presented, on May 30, 1863, a bill on the general population censuses.⁸⁴ Invoking the doctrine, by then received wisdom, that the «exact knowledge of the population is indispensable in the various branches of administration for the execution of a great number of civil and political laws», the bill established, firstly, the principle of decennial censuses of the population (art. 1), explicitly invoking the Brussels congress' recommendation of 1853, and the examples of Great-Britain, Belgium, Holland, Norway, and Italy (in France and in several German states the interval was even shorter). The report also made it clear that this disposition was intended to replace the practice of annual censuses.⁸⁵ Secondly, the bill set the date of December 31, 1863 for the first census (invoking once more the

Brussels recommendations) (art. 2). Although the measures to be taken were left for a forthcoming regulatory decree, the sanctions for their infraction were detailed from the start (single § of art. 2 and arts. 3 through 8). Finally, and most importantly, the government was authorized to disburse up to 25 000\$000 for census expenses (art. 9). This sum comprised 5 000\$000 for «paper and printing of instructions, family lists, tables for nationalities, sexes, ages, marital status, professions, etc» (half the amount foreseen in the budget proposal bill of 1861). The bill went on to establish the principle of paid enumerators, so as to «make them interested in the good accomplishment of this service», to whom it assigned the «distribution, storage, first counterproof and correction of family lists». At the rate of 5 *réis* per each inhabitant included in the census, 20 000\$000 would be spent (around 4 000 000 inhabitants).⁸⁶

The finance, legislation and statistics parliamentary committees gave favourable opinions on the bill⁸⁷, which, however, would not become law, since the House was not in session. Invoking this same argument and that of the generally acknowledged need and utility, the government decreed an extraordinary credit of 25 000\$000 over Finance in favour of Public Works⁸⁸, thus hinting, for the first time, which state department was to be in charge of the census. Finally, on July 23, the decree and the instructions for carrying out the census were published.⁸⁹

The decree orders the execution of a «general, nominal, and simultaneous» census of the Portuguese population of the continent and adjacent isles.⁹⁰ The census will begin and end on the same day, and will address the «existing population», that is, the *de facto* population (arts. 2 through 4).⁹¹ The inquiry, carried out through family (or *ménage*) lists, would include name, sex, age, marital status, and profession, and separate national and foreign citizens, residents and transient, present and absent (art. 5) which, in practice, would allow, as Ávila explained to the Berlin Congress, for the

simultaneous calculation of the legal population.⁹² As for the execution, the census was entrusted to prefects, municipal administrators and parish commissars charged with «directing, inspecting and ensuring the execution of the partial operations». Each of these authorities would be accompanied by a committee meant to «scrutinize, verify and comment» the results of the procedures (art. 6). The elementary census operations were assigned to special paid agents, to whom no more work than they could carry out in one day could be entrusted (art. 7). Finally, the Statistics Department had the task of gathering and centralizing «all the original elements of the census, from the family lists to the information from the prefect and special committee of the district» (art. 8).

These legal dispositions were expanded in special instructions annexed to the decree, to which we now turn.⁹³ The Instructions stipulate that special committees be created at each level of the peripheral administration. At the district level, the committee should aid the prefect in directing and inspecting census operations, and it should be composed of at least five persons (art. 1). Likewise, the municipal administrator should create a municipal committee with the same functions and, in accordance with each commissar, nominate the parochial census committees in each parish, composed of at least three members. These committees were to be made up of «public servants» and «persons of trust», chosen «amongst the parishioners who have the greater qualification concerning knowledge of the respective township» (arts. 2 and 3). The parochial committee would then proceed to choose the agent(s) in charge of the elementary census-taking operations in the parish, picking him (or them) «amongst the people who are knowledgeable of the parish, diligent, intelligent, and honest, so that they will offer guarantees of the timely execution» of their functions (art. 8). Aware of the need to convince citizens of the census' importance, the government calls on prefects, municipal administrators, parish commissars and their respective committees to use all the means

of «publicity and persuasion» within their reach (art. 11). As with any article of pure evangelization, the government betrays in the prayer its deepest fears: «[the census] will be undertaken in the interest of all and of the country's good administration; census that, far from preparing governmental ways of oppression or opprobrium, has no goal other than that of protecting the individuals, nourishing productive forces in the interior and national dignity abroad» (*ibidem*).

I stress the absence of references to parish priests, who are not even called upon to collaborate with the administrator and commissar in choosing the parochial committee, nor are they automatically present on these same committees. Furthermore, priests were not asked, for instance, to assist in the census' success from the pulpit. This omission meant the alienation of one of the most important means of publicity and persuasion of a largely illiterate, devout and gullible population. The government tried to make the execution of the census independent of the ecclesiastic structure, and this is one of the specifically *modern* features of this census. Simply to handle, *de jure*, the parish priests on equal footing with any other «persons of trust» in the localities is, in itself, surprising, since priests occupied a *de facto* central role in the communities, and the census' execution depended on eminently *de facto* aspects.⁹⁴

Concerning the paths the paperwork should follow, the Instructions stipulate that enumerators shall carry out a reconnaissance of the parish, so as to identify all the households, by their police number or, in its absence, by the name of the head of the family, using for this effect the model A bulletin. Once in possession of this information, the government will remit family bulletins (model B), in sufficient number, with a surplus of 8% to contemplate errors, losses, etc. The agents are also to explain to the heads of the family, «in a concise and clear way», how to fill out the family bulletin. The agent will have completed the distribution of the family lists (model B) by nightfall

of December 31st, guided by the lists of residences (model A), «so that no family or establishment, no matter how remote from the community's centre, may go unlisted, not even one single person as long as they have a roof over their head» (art. 13). On January 1st, 1864, enumerators will go door to door, collecting the lists, «scrupulously» ensuring that none are missing, that all are correctly filled out, and that they contain no error or occultation. In case the list is blank for lack of anyone who can read or write, and in the case of absent families, the agent shall fill out the list himself (arts. 25, 26 and 27). All lists are to be turned in to the parochial committees by January 4, along with the listing of homes and families (art. 28). Within the first ten days of the month of January 1864, the parochial committees shall, once they have verified and inspected the lists, turn them in to municipal administrators, along with a «lengthy report concerning the means of verification used by the committee and the [level of] trust merited by the results of the census operation, or the improvements the committee believes ought to be introduced in the future» (art. 29). The administrators, working with the municipal committee, «will consider the general results of the registration in the municipality he administers, formulate his opinion on these results and on the information from the parochial committees» and send the entire process on to the prefect until January 20 (art. 30). The prefect, assisted by the district committee, will undertake an evaluation of the general results and remit them, along with his judgement on them, to the government, through the Public Works minister, Statistics Department, by January 31, 1864 (art. 31).⁹⁵ Upon the good delivery of all these materials to the Statistics Department, enumerators will be paid a gratuity to be set by parochial committees, but which may never exceed 5 *réis* per person included in the census.⁹⁶ Once all districts files have been collected, the Department will sort the general results and publish them.

Three memorandums sent to prefectures further elaborated on these Instructions. The first of these details the way in which district, municipal, and parish committees should be created and composed, and urges all parties – prefects, administrators and commissars – to send on the notice on the number of residences in each parish, so that the agents might be provided, as quickly as possible, with the residence lists (model A), in order that the reconnaissance of the parish or parish section might be carried out. It recommends that all parties be «moved by patriotic spirits, in order to, by every means of publicity and persuasion [...] bring to the people the assurance that the census does not announce oppressions, but rather improvements in the public administration.»⁹⁷ The government, by harping on the key of publicity and persuasion, and on the undoing of erroneous notions, betrayed a realism that belied Ávila's optimistic stance in Berlin: «the census proceedings find no difficulties among us arising from popular prejudices, and on the contrary all are willing to discharge the duties they are assigned, making a proper evaluation of the advantages that will result from it; which is another proof of our peoples' good sense, and of the goodwill with which they are always ready to aid the government in anything that might contribute to the general well being.»⁹⁸

Modelo A

RECENSEAMENTO GERAL DA POPULAÇÃO—LISTA DOS FOGOS

Districto administrativo de ...

Concelho de ...

Freguesia de ...

Relação das casas habitadas e deshabitadas d'esta freguesia (ou ... secção da freguesia), e distribuição e arrecadação das respectivas listas de família

Nome		Numeração das casas		Nomes dos chefes de família	Número de ordem	Listas de família	
Do sítio da freguesia, do arrabalde, do lugar, da quinta ou do casal, etc.	Da rua	Habitadas	Desabitadas			Nota das distribuídas	Nota das recolhidas
1.ª Secção							
Campolide	Rua direita	1	—	José Braz	1	Distribuída	Recolhida.
		2	—	Antonio Peres	2	D.	R.
		3	—	João Francisco	3	D.	R.
		4	—	Antonio Maria	4	D.	R.
		5	—	Carlos José	5	D.	Não restituíu.
		6	—	—	—	—	—
		7	(1.º andar direita)	Manuel Antonio	6	D.	R.
		8	—	João José	7	D.	R.
		9	—	Manuel Maria	8	D.	R.
		10	—	Joachim Francisco	9	D.	R.
Arrabalde do Moinho	Travessa do Outeiro	—	4	—	—	—	—
		—	(2.º andar)	—	—	—	—
		5	—	Francisco Carlos	10	D.	R.
		—	6	—	—	—	—
		—	(agua furtada)	—	—	—	—
Quinta do Pintor 1.º andar	—	—	7	José Joaquim	11	D.	R.
		—	—	—	—	—	—
		—	—	—	—	—	—
		—	—	Maria Julia	12	D.	R.
		—	—	José Antonio	13	D.	R.
		—	—	Antonio Mannel	14	D.	R.
		—	—	—	—	—	—
2.º andar	—	—	—	—	—	—	
lado direito	—	—	—	—	—	—	
lado esquerdo	—	—	—	—	—	—	
agua furtada	—	—	—	—	—	—	

O agente do recenseamento, *Manuel Bento*.

Modelo B

RECENSEAMENTO GERAL DA POPULAÇÃO—LISTA DE FAMÍLIA—N.º ...

Districto administrativo de ...

Concelho de ...

Freguesia de ...

Lugar de ...

Casal de ...

Rua de ...

Número da casa ...

Relação de todas as pessoas que pernottaram na habitação d'esta família, ou estavam d'ella ausentes na noite de 31 de dezembro de 1863

(Esta relação deve ser assignada por quem a der, declarando se a dá como chefe de família, se como director, secretario, mordomo, etc., da casa ou estabelecimento de que se trata)

Numeração das pessoas	Nomes e appellidos	Idade Anos completos (Des que tiverem menos de dois anos, deve dizer-se os meses que têm)		Estados (Solteiros, casados ou viúvos)	Profissão, officio, occupação ou condição social (Deve dizer-se exactamente a occupação principal, não só dos homens, mas também das mulheres e menores que tiverem pro- priedade de trabalho. O proprietario de bens rurales, se for tam- bem cultidador, deve declarar ambas as cousas; bem como o cultidador, que for apenas rendeiro da terra.)	Observações (Nesta columna se notam com o palleto: Ausente, ou que não pernottaram em casa; Transeunte, os estranhos que por acaso ali pernottaram; Estrangeiro (e multi a multi a que pertencer) o que e for, sendo naturalizado portuguez, levará mais a palavra Naturalizado.)
		Anos	Mezes			
1	João Francisco	36	—	Casado	Alfaiate.	
2	Maria Antonia	40	—	Casada.		
3	Carlos Augusto	20	—	Solteiro.	Caixeiro.	Transeunte. Estrangeiro (belga).
4	Antonio Maria	35	—	Viúvo.	Jardineiro	Ausente. Estrangeiro naturalizado.
5	José	—	16	Solteiro.		
6	Vário	—	1	Idem.		
7	Etc.					
etc.						

Verificado por mim agente do recenseamento, *Manuel Bento*.

João Francisco, chefe de família.

(Diário de Lisboa, 1863, p. 2256.)

IV

11 DE AGOSTO 1863. — Circular aos governadores civis. — Preliminares do recenseamento geral da população

III.^{ma} ex.^{ma} sr. — Transmitto a v. ex.^a os exemplares, constantes da nota junta, do decreto e instruções de 23 de julho ultimo, acerca do recenseamento geral da população, que deve effectuar-se no dia 31 de dezembro proximo futuro. A distribuição dos mesmos exemplares deve ser feita por esse governo civil de modo que toquem dois a cada regedoria de parochia e dois a cada administração de concelho.

V. ex.^a não ignora que a execução de muitas das nossas leis depende do conhecimento da cifra da população, não tenho por isso necessidade de descer á enumeração das considerações que impõem a todas as autoridades e funcionarios a obrigação de empregarem a maior solicitude para a boa execução da vasta e importantissima operação do censo. O governo, para conseguir o fim desejado, não duvida um momento da activa e illustrada cooperação de todos os seus empregados.

Convem para isso que v. ex.^a recomende desde já, com a maior instancia, aos administradores de concelho do seu districto:

1.º Que nomeiem immediatamente as comissões de concelho e as de parochia, para membros das quaes podem fazer acertadissima escolha nos parochos, membros das camaras municipaes e juntas de parochia, juizes de paz e eleitos, professores de instrução secundaria e primaria, membros de sociedades legalmente constituídas, etc.; advertindo que nos concelhos que são cabeça de districto (á excepção dos bairros de Lisboa e Porto) se póde prescindir da commissão de concelho, ficando fazendo as suas vezes a commissão de districto;

2.º Que, nomeadas as comissões de concelho e de parochia, todas se installe logo e comecem o desempenho da sua missão;

3.º Que as comissões de parochia, sem perda de tempo, forneçam ao respectivo administrador de concelho nota (com a possivel exactidão) do numero de fogos que ha em cada freguesia, para que o mesmo administrador possa cumprir o que lhe incumbe o artigo 4.º das instruções;

4.º Que as comissões de parochia tratem desde logo de estudar a conveniencia ou inconveniencia de dividir a sua freguesia em secções (instruções, artigo 7.º); escolhendo para cada uma d'ellas o agente que melhor estiver nas circumstancias ponderadas no artigo 8.º das instruções; convido muito que tenham bem presente, que d'esses agentes depende a maior ou menor exactidão das informações que se exigem, porque elles proprios teem muitas vezes não só de corrigir as faltas que poderem apreciar nas listas de família que recolherem, mas também de encher as listas das famílias em que não houver quem saiba escrever, ou que no dia

Model A (Residence List) and Model B (Family List) used in the 1864 general census.

Source: *População. Censo no 1º de Janeiro de 1864*, p. XX.

In early November 1863, through a note to prefectures, Public Works sent the residential lists needed for the reconnaissance of parishes, along with instructions as to how they should be filled out by census agents.⁹⁹ At last, the preliminary process of the census was complete with the November 18 dispatch to prefects. This included the family lists, along with instructions and recommendations. This dispatch allows us to see that, undesirable though this might be, there were cases in which elements of the parochial committees were also acting as enumerators, an aberrant situation since presumably they were in charge of inspecting their own work. The deadline of January, 4th is stressed once again for the collection of family lists from the parochial committee; procedures for the inspection of enumerators are given, and several recommendations are made as to how they should proceed in dealing with several anomalous situations.¹⁰⁰

On the eve of the census, Beja's prefect shared his expectations with the government, using what little optimism survived a melancholy and realistic view of the problems to be met: «and although I may not flatter myself with the hope of presenting to Your Majesty a perfect work, for that was impeded by novelty, by the noticeable lack of staff in possession of the indispensable aptitude, and the tiny remuneration they are given to properly carry out the jobs they are assigned, it is my belief that if the results of my district's population census are not the expression of truth, they will at least come close to it, and surely we will reap statistical data that is more perfect than those we have been lead by thus far» (*Relatórios*, Beja, 1863: 7). This was, then the expectation: as (truly) bad as the census might be, it was still sure to be better than the abysmal state of affairs thus far.

Findings and execution of the 1864 census

My position entitles me to expect that the public will credit the figures I present as an expression of the truth, not of that which truly exists, because a perfect census is nearly impossible, and ours is full of imperfections; but truth, concerning what was found, what was received by the department; in short, official truth.

Brandão e Albuquerque, 1866¹⁰¹

Concerning the census' final cost, aside from the 25 *contos* from the credit authorized by the 9-7-1863 decree, we must add part of the 7 000\$000 allotted in the law of 27-6-1864 meant to cover the sorting expenses and those of the Portuguese delegation to the Berlin Congress.¹⁰² Another source¹⁰³ indicates that 4 975\$000 of these 7 *contos*, were intended for the sorting, which gives an amount around 1.25 *réis* per person included in the census (by contrast with the amount spent in the Belgian census, and mentioned in the May 18, 1864 proposed bill, of 3.5 *réis*/person).¹⁰⁴ To this sum, we must add 578\$475 from the Public Works' budget. Thus, we have: printed materials, 4 787\$740¹⁰⁵; 8 352 enumerators, 21 120\$745¹⁰⁶; general sorting, 4 644\$990; total sum, 30 553\$475.¹⁰⁷ The final sorting process took 15 months and was done by civil parish, sex, marital status and age, but *not* by occupation, *nor* by education. The *de facto* population and the legal, or *de jure*, population was computed.¹⁰⁸

Concerning how well the census went, and, consequently, the trust one could have in the final results, criticism was widespread and pointed, starting in the Statistics Department itself, both in Albuquerque's partial presentation, in 1866, and in the final publication of the census, in 1868, authored by Torres. These are not, however, the first available pictures of how the census taking went. As we cannot access the Statistics

Department's internal documentation, we turn to prefects' reports. The prefect of Beja admitted that:

«[In the] presence, especially, of the information surmised by local administrative authorities, the near impossibility of emitting a sure appraisal of such works, since some of these [reports] provide no enlightenment by which to appreciate with more or less substance the general result of enrolment in the various municipalities.[§] The populations, rightly or wrongly worried with the fear the census would be a means of launching new tributes, whisper against it, and oppose and frustrate its procedures. Oftentimes the authority, intimidated by the effect of popular opinion, abstains from taking the census, and substitutes artificial calculations for the true figures the procedure ought to have provided [...] [§] Amongst us, the lack of schooling, on the one hand, especially in rural parishes, and on the other the lack of intelligence in many of the staff in charge of directing and executing the census' partial procedures, were certainly the causes that showed in the making of this important service, although reports were uniform in their assurance that they do not at all influence general results, which are somewhat closer to truthful enrolment, and so this work is acceptable as a first attempt amongst ourselves. [§] [The government was sent] all the files of the general population census, with the general reports that accompanied them, many of them deficient and confusing [...] From the manner in which the population census, and in general other statistics, are carried out, we can hardly count on the exactness of the information obtained.» (*Relatórios*, Portalegre, 1863: 1-3).

The execution of the 1864 census was faced with the very same hardships that plagued annual censuses. The same lack of schooling in the population and the staff, the same incompetence, lack of commitment, poor territorial division and abhorrence by the population, all frustrated the execution of the census, which, we must say, is not surprising. Brandão e Albuquerque gives examples of the «inexactness of the information obtained» by the census: around 70 000 more women than men; 5 000 more single women than single men; 20 000 more married men than married women, and 90 000 more widows than widowers; 200 people over the age of 100. He was convinced, as was the Department, that the «census fails in being diminished, and not in being

augmented, especially in the more populated cities, of which Lisbon e Porto stand out». ¹⁰⁹

According to José de Torres, in his Introduction to the census publication, the sorting by occupation was not carried out because that part of the bulletins was «so imperfectly and incompletely filled out». The success of the task would have been altogether different had there been «less negligence on the agents' part, had they had more reflection and more zeal». However, he perspicaciously admits, «the scope of the difficulties of the work in a country, such as ours, where it is so common for the same individual to hold at the same time two or more occupations or trades; where the circle is so tight to which in many lands the subdivision of labour is reduced; where the rural communities are so poorly made up; where in many parts the judgement of certain industries is so differently made; where there is an absolute lack of well ordered records or enrolments of the diverse classes of society». In sum, the «power of inertia among the people, more clues than evidence, contradiction in information, distinct judgments in classification, doubts in the appraisal of trades, reduced this part of the census to a sterile hope». ¹¹⁰ Nor was it possible to distinguish uninhabited residences from those inhabited (since these categories were «equivocally and deficiently filled out»), or to sort out among the population the origins and nationalities (due to «deficiency or confusion presented by the elements collected»). The gathering of information as to schooling credentials was not so much as attempted, in order to keep from «increasing too much the difficulties of the first census». ¹¹¹ The lack of police numbers for the houses, felt very commonly «in nearly all the kingdom», did not help in all of this. ¹¹²

One of the causes for the sluggishness – 15 months – of the sorting procedure was the fact that the base unit, the civil parish, did not always coincide with the ecclesiastic circumscription. The census found that there were 3 979 parishes. Now, this

number was incorrect. 140 posterior corrections were needed to come up with the exact total of 3 965, and 82 cases were found in which the civil parish and the ecclesiastic were at odds.¹¹³ Why?

«The entire census process was done via the municipalities; in this manner, when it happened that two parishes with ecclesiastic autonomy were civilly annexed, the municipal administrator rightfully gathered the files for the two parishes into a single one, being that both were administered by a single parish commissar: even with recourse to the ecclesiastic division, it is still hard to know the number of parishes existing in the country, for it happens that parishes that once had ecclesiastic autonomy and sent to the ecclesiastic ministry the statistical maps extracted from their registry books, in light of the April 2nd 1862 decree, have ceased sending them, and the parish is extinguished! The reason for this is lacking: the answer is that His Excellency the bishop has, by his own authority, annexed it to another parish! In other cases, a new parish will appear; which is to say, there were no maps that previously mentioned this parish; when asked for the reason for its appearance, the answer is: "the parish was annexed to another and His Excellency the prelate has divided them!"»¹¹⁴

The difficulties were such that, on the occasion of the census' publication, the Department explicitly suggests the use of the ecclesiastic parish, rather than its civil counterpart, as base unit for sorting the data: «The study of this important part of the work, and the experience accumulated, persuade [us] that in the present condition of our administrative sections, and in a country in which the record of the most important acts of the population's civil status and movement [...] has the parish priests for public officials, in a country in which the ecclesiastic parish is the territorial unit, possessing the most elements of duration and immutability, this unit, with its more permanent character, ought to be preferred as a starting point for this work, and the civil administration should appropriate it according to need.»¹¹⁵

Another important obstacle was the population's distrust. The much recommended persuasion and publicity seem not to have been effective. The population,

for its most part, will have looked on the census with suspicion, and convinced itself that it had been enacted in the service of the creation of new taxes. «Hence, some fraud was organized, particularly in the identification of the individuals' professional activities, and of their ages» (*Relatórios*, Horta, 1863: 2). The general state of the population, we should note, was not exactly one of orderly calm, which did nothing to aid the census' success. The murmur of resistance to the state's «panoptical» presence was audible throughout the land. In effect, the year 1862 had witnessed, especially in Minho («*Maria Bernarda*») and the adjacent isles, a succession of all sorts of «popular ravings», provoked by the «new tributary system», which contained the introduction of the personal and industrial contribution (the adjacent isles' tributary system was finally aligned with the continental, doing away with the tithes), and by the introduction of the metrical-decimal system. The arousal of popular spirits, often kindled by political interest, was linked, specifically, to the updating of land registries (the property tax, decreed in 1852, was not regulated until 1855-56, and the land registries, thought to be wanting, were not revised until the early 1860's). On this point, the publication of the census is ambiguous, for it both mentions that «it was carried out throughout the kingdom with no popular opposition, [having had] in many parts the enlightened aid and support of authorities, staff and citizens», and it laments the lack of «concurrence of wills» and of uniformity in the «populations views», listing «erroneous prejudices» amongst the many obstacles that stood in the way of the census' execution.¹¹⁶ On this subject, Albuquerque was not so ambiguous:

«[Amongst] the ruder classes, especially, suspicion was widespread, that the census was meant to raise the taxes and widen the recruitment; such unkind words could not but act upon the people's spirit, and the result was the decrease of people in the bulletins; this theft was great as it was nearly general: in the most populated cities, especially, the number of servants was cut back, for the same reason. With such

uncertain elements, one should not wonder that this first work should be imperfect, it was no more than a rehearsal.»¹¹⁷

Conclusion

The general population census of January 1st, 1864 endeavoured at being a census that, on the one hand, would faithfully follow the recommendations of the International Statistical Congress – or would, from its express and constant invocation, gain political leverage –, and would, on the other hand, overcome the (lack of) quality of the annual censuses taken by the Ministry of the Interior, and, finally, would be carried out without resort to parish registries, or to the Church's territorial network. In sum, the government aimed at the first Portuguese modern census.

The 1864 census was at once a success and a failure, in other words, indisputably, the quality of the results exceeded that of the annual censuses; however, it came up short of the expectations, both from the viewpoint of the wealth of information and of the efficiency of the census-taking machinery.¹¹⁸ That much was made clear by José de Torres when the census was published; it was also made clear by the 1878 census regulations, which differ in very significant details. The listing of the 1864 census' shortcomings and the breadth of the difficulties found was stated with candour when it was first published, in 1868, and by the Statistics Department's head's hand. It is not hard to guess what the absence of a «concurrence of wills» and of a «uniformity in the population's views» means. Still, the obstacles «born out of erroneous prejudices» cannot, could not, «frighten public powers».¹¹⁹

The ubiquitous topic of «the people's abhorrence» and of «our people's social backwardness» is of great importance. So much so that, as early as 1854, Oliveira Marreca had invoked it as an argument for taking away from the Government and handing over to the Academy (a «literary corporation, as harmless as science and as

disinterested as the truth») the collecting of statistical information, which is «constantly denied, or only adulterated will come to the authority, and to the Government, always suspected in such matters of collecting data on the individual and on the fortune of the tax-payer in order to better bleed them, under the misleading guise of those who ask materials for a scientific endeavour.»¹²⁰ If it is true that filling positions in the peripheral administration was made difficult by the scarcity of literate people in the localities, favouring pluriactivity and begetting clientele relations, it is no less true the inertia presented by the gap in the population's formation for liberal citizenship was just short of invincible. As with the case of popular uprisings against weights and measures and land registries, public officials brave enough to put their finger in this wound were few and far between. Brandão e Albuquerque did so, at least as piously as Oliveira Marreca:

«The truthful, conscientious, and scrupulous statistics, as it ought to be, is undeniably the prime element of good administration. Until the people do not fully apprehend these truths, and do not resolve to turn in to their rulers statistical data as exact as possible, they cannot aspire to be well governed. [§] The government administers this great household called nation. [...] As long as statistics are done arbitrarily behind the closed doors of authorities' offices, with data born of mistrust that the government might abuse the truth, do not expect good government.»¹²¹

The 1864 census' legal dispositions concerning the selection of parochial committees did not specify the obligatory presence of a parish priest, neither was his opinion required to conduct the appointment. It was only in the instructions to the prefects that priests were included, as one amongst other suggestions, in the list of those who could be appointed to the parochial committee. If we recall the absolute centrality of priests in the parishes' life, in general, and in all things pertaining to the collection of information on the population, in particular, and that priests were members of and inherently presided over the parish council¹²², we will readily see here, behind an apparently straightforward issue of administrative policy, a clear statement in favour of the

separation between State and Church, with ideological and provocative overtones. This secular cry should be understood within the larger context of the «religious question»¹²³, the Sisters of Charity polemic with which Loulé's government was flogged¹²⁴, and the February, 1st and November, 11, 1862 laws which had «nationalized» priests.

In 1868, when the 1864 census was published, the use of the ecclesiastical parish as base unit for the next census was already being suggested, instead of its civil counterpart. The «insult» contained in the 1864 census' regulations was reversed for the 1878 census. In 1878, besides increasing parochial committees from 3 to 5 persons, the presence of the priest in the committee was made mandatory, as well as his collaboration in appointing it.¹²⁵ From the viewpoint of «publicity and persuasion», in addition to a vocal note to the press, a general ordinance was sent to prelates urging them to give «instructions to parish priests [...] so that they can lend their precious and effective help to census operations, contributing with their cooperation to the closest expression of truth, as well as to destroy erroneous prejudices that may arise against the census, reassuring them that in no way is it the case that vexing and oppressing governmental means are being concocted [...]».¹²⁶ The unequivocal affirmation of the cooperation between the Church and the 1878 census did not end here. When the latter was published, the Department decided to include the provisions issued by Aveiro's vicar-general, by the bishop of Porto, and by the archbishops of Braga and Évora forcefully mobilizing priests to the census opus.¹²⁷ One cannot deny the effort not only to evince cooperation, but also to hold the Church responsible for the census' success or lack thereof. Thus, in general, the census of 1878 represents a retrocess in the «insularization» of bureaucracy, much as it evinces a «learning process» embodied in the admission and deduction of consequences from the fact that the Church's network

and influence were not to be despised, but rather co-opted. The government thus hoped to gain a measure of efficiency, obviously not perfect, but some, nonetheless.

Here we come across another instance of the hardships endured by the «Regeneration» state in the exercise of power throughout the territory. Let me recall that though elections were of a crucial importance, they were neither free, nor just.¹²⁸ The difficulties in recruiting men for the army¹²⁹, collecting direct taxes¹³⁰, surveying maps¹³¹, carrying out the metric system¹³² and – as this chapter demonstrates – taking the population census were general. To cope with them, there developed, mostly around the state's peripheral administration, a model of contractualized exercise of power.¹³³ The notorious «difficulties» became ingrained in the way power was exercised. The dividing line between state administration and competing social powers was drawn *within* the state itself. It behoves us, however, to stress that the standard against which state «efficiency» is measured is but an ideal-type. Nowhere did the model of rational, insulated, weberian-like bureaucracy know historical existence, not in France, as Almeida recalls *a propos* French prefects and the myth of centralization¹³⁴, not even in Prussia, as Sousa points out for the direct utilization of civil servants in electoral disputes.¹³⁵

Finally, and still concerning the rather complex exercise of territorial power by the state, that «pouvoir sans puissance»¹³⁶, a loose and entangled fabric woven from the threads of draft, elections, censuses, public order and administrative bureaucracy, I conclude with a sibylline and pointed comment made by Bragança's prefect:

«It is known that the administrative authority, except in the district's capital, where it can avail itself of force to buttress action, risks losing face every time it tries to employ vigorous measures ill-loved by the people, thus promoting the exact disobedience that, even if later to be punished, has already been the thermometer of authority's weakness. No one ignores that the latter, of necessity involved in electoral procedures, though it wishes to restrict itself to exercising functions

assigned by law, is ever more entangled in the web of encumbrances to the freest fulfilment of its duties. [§] Finally, also undeniable, is the sterility of the current administrative set up, which puts its organs in the fatal necessity to oftentimes play the role of deaf-and-dumb spectators of the unabidance of the law.»¹³⁷

Notes

¹ Quoted in August Meitzen, *History, Theory, and Technique of Statistics. Part First: History of Statistics*, Philadelphia, American Academy of Political and Social Science, 1891, p. 44.

² Luís Espinha da Silveira, coord., *Os Recenseamentos da População Portuguesa de 1801 e 1849. Edição crítica*, Lisbon, INE, 2001, p. 63.

³ Alexandre Herculano, «Proposta para a criação de uma estatística nacional», in Alexandre Herculano, *Opúsculos. Tomo II. Questões Públicas. Sociedade-Economia-Direito*, Lisbon, Bertrand, 1986 [1853], p. 281.

⁴ Decrees 16-5-1832 and 18-7-1835; Administrative Codes of 1836 and 1842.

⁵ Art. 224, § 7 of the 1842 Administrative Code.

⁶ Espinha da Silveira, *Os Recenseamentos...*, op. cit., 2001, pp. 68-69. See also Fernando de Sousa, *História da Estatística em Portugal*, Lisbon, INE, 1995, p. 165.

⁷ Espinha da Silveira, *Os Recenseamentos...*, op. cit., 2001, p. 64.

⁸ Ministerial ordinance 16-10-1836.

⁹ Decree 28-11-1878.

¹⁰ «Registo civil», in Joel Serrão, dir., *Dicionário de História de Portugal*, vol. III: 559-560 and Fernando Catroga, *O Republicanismo em Portugal. Da formação ao 5 de Outubro de 1910*, Lisbon, Editorial Notícias, 2000, p. 210.

¹¹ Espinha da Silveira, *Os Recenseamentos...*, op. cit., 2001, p. 69.

¹² António de Oliveira Marreca, *Parecer e Memoria sobre a proposta, que apresentou o sr. Alexandre Herculano, para que a secção de sciencias economicas e administrativas redigisse um Projecto de Estadística por...*, Lisbon, Tip. da Academia Real das Ciências, 1854, p. 92.

¹³ Marreca, *Parecer...*, op. cit., 1854, pp. 92-93.

¹⁴ Torres, *Relatório-Consulta...*, op. cit., 1861, p. 9.

¹⁵ «Registo paroquial», in Serrão, dir., *Dicionário de História de Portugal*, vol. III, pp. 560-563.

¹⁶ Espinha da Silveira, *Os Recenseamentos...*, op. cit., 2001, pp. 80-83.

¹⁷ *Relatórios*, Évora, 1856, p. 137.

¹⁸ *Relatórios*, Guarda, 1858, p. 4.

¹⁹ *Relatórios*, Braga, 1858, p. 4.

²⁰ *Relatórios*, Leiria, 1858, p. 9.

²¹ *Relatórios*, Guarda, 1863, p. 7.

²² Catroga, *O Republicanismo...*, op. cit., p. 209.

²³ See the exemplary case of the Ministry of Finance's peripheral administration studied by Paulo Silveira e Sousa, «A Construção do Aparelho Periférico do Ministério da Fazenda em Portugal (1832-1878)», in Pedro Tavares de Almeida e Rui Miguel C. Branco, dirs., *Estado e Território. Portugal e Espanha. Séculos XIX-XX*, Lisbon, Livros Horizonte, 2005 (awaiting publication).

²⁴ Silveira e Sousa, «A Construção do aparelho...», op. cit., 2005; Tavares de Almeida, *A Construção do Estado Liberal...*, op. cit., 1995; Espinha da Silveira, *O Estado em Portugal...*, op. cit., 2002, p. 5.

²⁵ Espinha da Silveira, *Os Recenseamentos...*, op. cit., 2001, p. 77.

²⁶ Espinha da Silveira, *Os Recenseamentos...*, op. cit., 2001, pp. 77-82.

²⁷ The global findings and results of both 1849 and 1850 annual censuses were published in yearly report of the Ministry of the Interior of 1851 and 1854, respectively, and recently reproduced in David Justino, *A Formação do Espaço Económico Nacional. Portugal 1810-1913*, vol. II, Lisbon, Vega, 1989, pp. 265-266.

- ²⁸ Espinha da Silveira, *O Estado em Portugal...*, op. cit., 2002, p. 83.
- ²⁹ Marreca, *Parecer...*, op. cit., 1854, p. 93; Joel Serrão, «Da Contagem da Gente Portuguesa», in Joel Serrão, *Da «Regeneração» à República*, Lisbon, Livros Horizonte, 1990, pp. 7-36, here p. 22; Sousa, *História da Estatística...*, op. cit., 1995, p. 127.
- ³⁰ Charles Vogel, *Le Portugal et ses colonies. Tableau politique et commercial de la monarchie portugaise dans son état actuel*, Paris, Guillaumin, 1860, p. 206.
- ³¹ Fontes' government refrained from direct productive activities, focusing on infrastructures connected with commercial development, leaving industry proper to «free enterprise», according to the «most classical of models», Manuel Villaverde Cabral, *O desenvolvimento do capitalismo em Portugal no século XIX*, Lisbon, A Regra do Jogo, 1976, p. 189. On the «fontismo», see Maria Eugénia Mata, «As três fases do fontismo: projectos e realizações» in AA.VV., *Estudos e ensaios em homenagem a Vitorino Magalhães Godinho*, Lisbon, Sá da Costa Editora, 1988, pp. 413-431, here pp. 417 and 419-420; and Rui Ramos, «O sistema fontista» in António Reis, dir., *Portugal Contemporâneo*, Lisbon, Publicações Alfa, 1990, pp. 125-146.
- ³² Report annexed to the decree setting up the General Statistical Board (*Conselho Geral de Estatística*) of 28-12-1864.
- ³³ Sousa, *História da Estatística...*, op. cit., 1995, pp. 145 and 165.
- ³⁴ Arts. 8, 9 and 10 of decree 30-9-1852, *Diário do Governo*, n. 243, 14-10-1852.
- ³⁵ From the Paris' 1855 Congress recommendations, Theoretical Part, section «organization of Statistics», point i): «Le Congrès émet le vœu: qu'il soit institué dans chaque État une commission centrale de statistique, au une institution analogue, formée des représentants des principales administrations publiques et d'autres personnes [compétentes] [...]», in Ernest Engel, dir., *Compte-Rendu Général des Travaux du Congrès International de Statistique dans ses séances tenues à Bruxelles, 1853, Paris, 1855, Vienne, 1857, et Londres, 1860, publié sous la direction du Dr. Engel*, Berlin, Imprimerie Nationale, 1863.
- ³⁶ Decree 8-8-1857, *Diário do Governo*, 18-9-1857. The Board's members were appointed in September, 17 (*Diário do Governo*, 26-9-1857).
- ³⁷ Preamble to decree 5-10-1859 and § 3 of art. 4, decree 5-10-1859.
- ³⁸ See biographical sketch in José Fernandes Mascarenhas, *Organismos oficiais de estatística portugueses*, Lisbon, Grupo Desportivo do INE, 1959, pp. 21-23.
- ³⁹ Ministry of Justice and Ecclesiastical Affairs ordinance to prefects, 18-8-1857.
- ⁴⁰ António José de Ávila, «Acta da quinta sessão do Congresso Internacional de Estatística de Berlim celebrada no dia 8 de Setembro de 1863», *Boletim do Ministério das Obras Públicas, Comércio e Indústria*, n. 1, January, 1864, pp. 151-160, here p. 152. Manuel Pinto dos Santos, *Monarquia Constitucional. Organização e Relações do Poder Governamental com a Câmara dos Deputados. 1834-1910*, Lisbon, Assembleia da República, 1986, pp. 75 and 81.
- ⁴¹ Sousa, *História da Estatística...*, op. cit., 1995, p. 165.
- ⁴² Samuel Brown, «Report on the Sixth International Statistical Congress, held at Florence, from 29th September to 5th October, 1867», *Journal of the Statistical Society of London*, vol. XXXI, part I, March, 1868, pp. 11-24, cit. pp. 23-24.
- ⁴³ In the twenty three years that followed the first session of the Congress in Brussels, another eight sessions took place: Paris, 1855; Viena, 1857; London, 1860; Berlin, 1863; Florence, 1867; Hague, 1869; St. Petersburg, 1872 and Budapest, 1876.
- ⁴⁴ Engel, *Compte-Rendu...*, op. cit., 1863, p. 3.
- ⁴⁵ António José de Ávila, *Relatório sobre os Trabalhos do Congresso Internacional de Estatística reunido em Berlim em 1863 pelo...*, Lisbon, Imprensa Nacional, 1864, pp. 23-24.
- ⁴⁶ Pierre Maestri, dir., *Compte-rendu des travaux de la vi session du Congrès International de Statistique, reuni à Florence...*, Florence, Imprimerie de G. Barbèra, 1868, p. 468. Portugal did not send a delegate to the Florence session, see Brown, «Report on the Sixth...», op. cit., 1868, p. 16.
- ⁴⁷ Brown, «Report on the Sixth...», op. cit., 1868, p. 12.
- ⁴⁸ Engel, *Compte-Rendu...*, op. cit., 1863.
- ⁴⁹ Ávila, «Acta da quinta sessão...», op. cit., 1864, pp. 151-160.
- ⁵⁰ Ávila, «Acta da quinta sessão... », op. cit., 1864, p. 152.
- ⁵¹ «The outward character of the congresses was brilliant, under eager competition between the various nations where the congresses were held, with distribution of stars and ribbons, excursions and banquets for the members, but it is not to be wondered at that Governments grew tired of this lavish hospitality», in

Harald Westergaard, *Contributions to the History of Statistics*, Hague, Mouton Publishers, 1932, quote. p. 183.

⁵² Ávila, *Relatório...*, op. cit., 1864, p. 73.

⁵³ Engel, *Compte-Rendu...*, op. cit., 1863, p. 214.

⁵⁴ Meitzen, *History, Theory, and Technique...*, op. cit., 1891, p. 44; Preamble to decree 23-7-1863.

⁵⁵ Carreras y Gonzalez, «El movimiento...», op. cit., 1885, pp. 3-17,

⁵⁶ Preamble to decree 23-7-1863.

⁵⁷ Meitzen, *History, Theory, and Technique...*, op. cit., 1891, p. 64.

⁵⁸ Preamble to decree 23-7-1863.

⁵⁹ Meitzen, *History, Theory, and Technique...*, op. cit., 1891, p. 65.

⁶⁰ Meitzen, *History, Theory, and Technique...*, op. cit., 1891, p. 61; Preamble to decree 23-7-1863.

⁶¹ *Relatórios sobre o estado da administração pública nos distritos administrativos do Continente e Ilhas Adjacentes, em...*, Lisbon, Imprensa Nacional, 1857-1865 and *Colecção dos relatórios das visitas feitas aos distritos pelos respectivos governadores civis em virtude da portaria de 1 de Agosto de 1866*, Lisbon, Imprensa Nacional, 1868. The difference between the latter and the former source is that the latter results from a direct and personal inspection by the prefect, and not from a report put together in the prefect's office from reports, information and data submitted by municipal administrators. The reports will be referred to in an abbreviated manner, to wit: district, year to which they refer to, page.

⁶² Espinha da Silveira, *Os Recenseamentos...*, op. cit., 2001, pp.76-82.

⁶³ Arts. 255 and 246 of the 1842 Administrative Code. The parish commissar is not an administrative magistrate (art. 334 and ff. of the 1842 code). He was appointed by the prefect, following a proposal by the municipal administrator. Though he was not a magistrate, he performed functions (art. 342) of public administration and police, as long as these were delegated to him by the municipal administrator (by special charter, that could be permanent).

⁶⁴ Silveira e Sousa, «A Construção do aparelho...», op. cit., 2005, p. 16, note 41.

⁶⁵ Cf. *Almanaque Portugal para 1855*, Lisbon, Imprensa Nacional, pp. 233-244; cit. Sousa, «A Construção...», op. cit., 2005, p. 16, note 41.

⁶⁶ Art. 340 of the 1842 Administrative Code.

⁶⁷ In 1878, the estimated literate population over the age of seven was 21%; in 1850, 15%; in 1900, 25%. See António Candeias, dir., *Alfabetização e Escola em Portugal nos Séculos XIX e XX. Os Censos e as Estatísticas*, Lisbon, Fundação Calouste Gulbenkian, 2004, pp. 34 e 90. In 1864 there were 2 774 elementary schools to elementary school population of 99 256, vd. *População. Censo no 1º de Janeiro de 1864...*, op. cit., 1868, p. XVI.

⁶⁸ Espinha da Silveira, *Os Recenseamentos...*, op. cit., 2001, p. 69.

⁶⁹ «The lack of the said regulation [of art. 255 of the Administrative Code] has caused the registry to continue in parish priests' hands, and the keeping of registration books under their responsibility», José de Torres, *Relatório-Consulta da Repartição de Estatística acerca da Estatística Geral do Reino*, Lisbon, Imprensa Nacional, 1861, p. 9.

⁷⁰ Brandão e Albuquerque, *Censo de 1864...*, op. cit., 1864, p. x.

⁷¹ Luís Nuno Espinha da Silveira, *O Estado em Portugal durante a Regeneração (1851-1890)*, mimeo., Lisbon, 2002, pp. 26-27.

⁷² Espinha da Silveira, *O Estado em Portugal...*, op. cit., 2002, p. 35.

⁷³ Espinha da Silveira points out that «in the beginning of 1860, the percentage of recruits in debt to the contingent, in the whole of mainland Portugal, were the following: 42% (1856), 47% (1857), 61% (1858) e 77% (1859). This problem subsided for many years to come: in 1885 there was an accumulated debt since 1869 that reached 29%», in Espinha da Silveira, *O Estado em Portugal...*, op. cit., 2002, pp. 35-36.

⁷⁴ *Relatórios*, Ponta Delgada, 1860, p. 11. The district of Horta 1860 report also made the point that evading recruitment was a cause of emmigration.

⁷⁵ The formation of voter registration committees was regulated by arts. 20 to 25 of decree 30-9-1852, published subsequently to the *Acto Adicional* of June 5, 1852. See Pedro Tavares de Almeida, org. and introd., *Legislação Eleitoral Portuguesa. 1820-1926*, Lisbon, INCM, 1998, pp. XVI e 727.

⁷⁶ [Anónimo], *Biographia da vida escandalosa cheia de torpezas e crimes, do administrador do concelho d'Águeda Joaquim Álvaro de Figueiredo Pacheco Telles*, 1866, pp. 22-23 (emphasis in the original).

⁷⁷ This report was likewise quoted by Espinha da Silveira, *O Estado em Portugal...*, op. cit., 2002, pp. 37-38. Another useful summary, that only considerations of length prevent me from quoting, can be found in *Relatórios*, Angra do Heroísmo, 1862, p. 7.

⁷⁸ António do Amaral Pyrrait, *Os Recenseamentos da População. O Recenseamento Português de 1940*, sep. *Biblos*, vol. XVIII, tome II, Coimbra, 1943, pp. 6-7. See, for a more recent, and more «historicising», definition, Paul Starr, «The Sociology of Official Statistics», op. cit., 1987, definition p. 11.

⁷⁹ Torres, *Relatório-consulta...*, op. cit., 1861, pp. 3-5.

⁸⁰ Torres, *Relatório-consulta...*, op. cit., 1861, p. 7.

⁸¹ Torres, *Relatório-consulta...*, op. cit., 1861, p. 8.

⁸² Torres, *Relatório-consulta...*, op. cit., 1861, p. 8.

⁸³ Torres, *Relatório-consulta...*, op. cit., 1861, p. 137.

⁸⁴ «Proposta do governo acerca de recenseamentos gerais da população», 30-5-1863, in *População. Censo no 1º de Janeiro de 1864*, Lisbon, Imprensa Nacional, 1868, p. xvii (vd. *Diário de Lisboa*, 1863, pp. 1700, 2026, and 2037).

⁸⁵ Preamble to the «Proposta do governo acerca de recenseamentos gerais da população», 30-5-1863, in *População. Censo no 1º de Janeiro de 1864*, Lisbon, Imprensa Nacional, 1868, p. xvii (vd. *Diário de Lisboa*, 1863, pp. 1700, 2026 e 2037)

⁸⁶ Let me note that this principle countered the doctrine the Berlin session would set. On the other hand, if it would be paid the same as in the Belgian census (5,4 réis), it would be spent 32 000\$000.

⁸⁷ Treasury committee's advise, 8-6-1863; legislation committee's advise, 17-6-1863; and statistics committee's advise, 25-6-1863, in *População. Censo no 1º de Janeiro de 1864*, Lisbon, Imprensa Nacional, 1868, p. xvii.

⁸⁸ Decree 9-7-1863, in *População. Censo no 1º de Janeiro de 1864*, Lisbon, Imprensa Nacional, 1868, p. XVIII (*Diário de Lisboa*, 1864, p. 1613).

⁸⁹ Decree 23-7-1863 and Instructions, in *População. Censo no 1º de Janeiro de 1864*, Lisbon, Imprensa Nacional, 1868, pp. XVIII-XX (*Diário de Lisboa*, 1863, p. 2256).

⁹⁰ Art. 1, decree 23-7-1863 (*Diário de Lisboa*, 1863, p. 2256). The articles of this decree will be cited in the body of the text in an abbreviated manner.

⁹¹ *De facto* population refers to the population present at the census place, at the moment of the census taking. *De jure* or legal population refers to the population which has its legal domicile at the census place and that is registered there, as long as there is legal record of that fact. See M. P. Sémenow, dir., *Compte-Rendu de la Huitième Session à St. Pétersbourg publié...*, St. Petersburg, Imprimerie Trenké et Fusnot, 1872, p. 424.

⁹² Ávila, «Acta da quinta sessão...», op. cit., 1864, p. 152 and, by the same author, *Relatório sobre os trabalhos do Congresso Internacional de Estatística reunido em Berlim em 1863 pelo...*, Lisbon, Imprensa Nacional, 1864, p. 26.

⁹³ «Instruções que fazem parte do decreto de 23 de Julho de 1863, para se levar a efeito o recenseamento geral da população», *População. Censo no 1º de Janeiro...*, op. cit., 1868, pp. XVIII-XX. The articles of the Instruction will be cited in the body of the text in an abbreviated manner.

⁹⁴ Public Works' general ordinance to prefects, 11-8-1863, detailing the formation and functioning of parochial census committees, and commanding municipal administrators to «appoint immediately municipal and parochial committees, which members they would rightfully choose between parish priests, aldermen, members of parish councils, peace judges, elected judges, secondary and elementary school teachers, members of lawfully constituted societies, etc.» For district committees, see *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, pp. XX-XXI.

⁹⁵ This bulk of documentation (including the original return transcripts of household lists, family lists, and parochial, municipal and district committee's reports) is nowhere to be found, namely in the archive of the National Institute of Statistics, an unfortunate, but mostly scandalous fact; neither can it be found in the Statistics Department archive in the historical archive of the Ministry of Public Works; nor can it be found in the archive of the Ministry of the Interior in the Torre do Tombo. At first, I thought that as «centralising» as the decree might be, the fact that the whole structure of the Ministry of the Interior was being utilized implied that some archival trace would be left. Unfortunately, after having consulted the registry of incoming correspondence in the General-Department of Civil Administration of said Ministry between 1862 and 1868, there was not a single reference, a single file, concerning the general population census of 31-12-1863; neither concerning preparations during 1863, nor concerning results, findings, difficulties or any other reports, be that in 1865, 1865 or 1866.

⁹⁶ In this issue, Instructions go against the 1863 Berlin Congress' recommendations. In fact, the Congress changed position, from the Brussels 1853 stand in favour of paid enumerators to the Berlin stand, in favour of the unpaid involvement of the population (vd. Ávila, *Relatório...*, op. cit., 1864, pp. 25-26). This discrepancy is thus explained by Ávila, in the same report: «I should ponder, still, that the results of that

same census will show us the need and convenience of applying to our country the congress' resolutions as to the unpaid collaboration of inhabitants in taking the population census.» (*Idem*, p. 26).

⁹⁷ General ordinance from the Ministry of Public Works to prefects, 11-8-1863, in *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, pp. XX-XXI, cit. p. XXI (*Diário de Lisboa*, 1863, p. 2395).

⁹⁸ Ávila, *Relatório...*, op. cit., 1864, cit. p. 26.

⁹⁹ General ordinance from the Ministry of Public Works to prefects, 2-11-1863, in *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p. XXI (*Diário de Lisboa*, 1863, p. 3126).

¹⁰⁰ General ordinance from the Ministry of Public Works to prefects, 18-11-1863, in *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p. XXI (*Diário de Lisboa*, 1863, p. 3191).

¹⁰¹ Brandão e Albuquerque, *Censo de 1864...*, op. cit., 1866, p. vi.

¹⁰² Bill of law 27-7-1864 (*Diário de Lisboa*, 1864, p. 2253).

¹⁰³ José de Torres, «Portugal (Royaume de)», in Ernest Engel, dir., *Compte-Rendu des Travaux de la vième session du Congrès Internaitonal de Statistique réuni a Florence...*, Florence, Imprimerie de G. Barbèra, 1868, pp. 612-617.

¹⁰⁴ Proposal of bill 18-5-1864, «Proposta do governo para novo crédito aplicável a despesas do recenseamento gera da população», *Diário de Lisboa*, 1864, p. 1612 in *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p. XXII.

¹⁰⁵ Referring to: 10 000 copies of decree and instructions 23-7-1863, 20 562 household lists (model A), 1 200 000 family lists (model B) and 72 200 «sheets for the sorting of all these elements», «Relatório do governo acerca do uso feito do crédito extraordinário aberto para o recenseamento geral da população» of 18-5-1864, *Diário de Lisboa*, 1864, p. 1613, in *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, pp. XXII-XXIII.

¹⁰⁶ Each of the 8 352 enumerators registered an average of 124 households. See *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p. XV.

¹⁰⁷ A number of distrcits voted supplementary monies to assist the expenses with the census, as for instance Viana do Castelo, with 200\$000, and Bragança, with a supplementary gratuity of 2,5 réis paid for person; the first Belgian census cost, globally, 100 000\$000; the second, cost 36 000\$000 (vd. Torres, «Portugal (Royaume de)»..., op. cit., 1868, p. 613).

¹⁰⁸ *De facto* population: 4 188 410; *de jure* or legal population: 4 286 995, in «Definições e metodologia de apuramento», in *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, pp. XIII-XIV.

¹⁰⁹ Brandão e Albuquerque, *Censo de 1864...*, op. cit., 1866, p. ix.

¹¹⁰ [José de Torres], «Introdução», *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p.v.

¹¹¹ [José de Torres], «Introdução», *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p.v.

¹¹² *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p. V.

¹¹³ *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, pp. X e XV.

¹¹⁴ Brandão e Albuquerque, *O Censo de 1864...*, op. cit., 1866, p. XV.

¹¹⁵ *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p. v (our emphasis).

¹¹⁶ *População. Censo no 1º de Janeiro 1864...*, op. cit., 1868, p. vi.

¹¹⁷ Brandão e Albuquerque, *Censo de 1864...*, op. cit., 1866, p. viii.

¹¹⁸ The same point is made, in general terms, by Sousa, *História...*, op. cit., 1995, pp. 208-209.

¹¹⁹ Brandão e Albuquerque, *Censo de 1864...*, op. cit., 1866, p. vi.

¹²⁰ Marreca, *Parecer e Memoria...*, op. cit., 1854, p. 4.

¹²¹ Brandão e Albuquerque, *Censo de 1864...*, op. cit., 1866, pp. xvi-xvii.

¹²² Art. 291, 1842 Administrative Code. The parish comissar was rightfully present and held a consultative vote in the Parish Council's sessions (art. 303 of said Code).

¹²³ On this point, see José Miguel Sardica, *Duque de Ávila. Biografia*, Lisbon, Assembleia da República/Dom Quixote, 2005, pp. 352-355.

¹²⁴ See Maria de Fátima Bonifácio, *Apologia da história política*, chapter «A republicanização da monarquia (1852-1862)», 1999, pp. 241-359 and Vicente Ferrer Neto Paiva, *Discursos parlamentares (1839-1862)*, introd., selection and notes by A. Dias de Oliveira, Lisbon, 2003, pp. 251-370.

¹²⁵ Art. 3 of the Instructions annex to decree 6-6-1877 commanding the general census of the population to take place in 31-12-1877, in *População no 1º de Janeiro de 1878*, Lisbon, Imprensa Nacional, 1881, p. xxx.

¹²⁶ General note to the prelates of June 20, 1877 and note to the press of June 20, 1877, both issued by the Ministry of Public Works, in *População no 1º de Janeiro de 1878*, Lisbon, Imprensa Nacional, 1881, p. xxxii.

¹²⁷ Provisions issued by the vicar-general of Aveiro, 6-8-1877; by the bishop of Porto, 7-12-1877; and by the archbishops of Braga and Évora, 15-12-1877 in *População no 1º de Janeiro de 1878*, Lisbon, Imprensa Nacional, 1881, pp. xxxiv-xxxix.

¹²⁸ Pedro Tavares de Almeida, *Eleições e caciquismo no Portugal oitocentista (1868-1890)*, Lisbon, Difel, 1991.

¹²⁹ Espinha da Silveira, *O Estado em Portugal durante a Regeneração...*, op. cit., 2002, pp. 21-39.

¹³⁰ Maria Eugénia Mata, *As Finanças Públicas Portuguesas da Regeneração à Primeira Guerra Mundial*, Lisbon, Banco de Portugal, 1993; Silveira e Sousa, «A Construção...», op. cit., 2005.

¹³¹ Rui Miguel C. Branco, *O Mapa de Portugal. Estado, Território e Poder no Portugal de Oitocentos*, Lisbon, Livros Horizonte, 2003, pp. 85-150.

¹³² Rui Miguel C. Branco, «A Introdução do Sistema Métrico-Decimal...», op. cit., 2005.

¹³³ For a characterization of this model from the viewpoint of the prefect's functions, see Pedro Tavares de Almeida, *A Construção do Estado Liberal. Elite política e burocracia na «Regeneração» (1851-1890)*, mimeo., Lisbon, FCSH/UNL, 1995, pp. 166-170; vd. also Espinha da Silveira, *O Estado em Portugal durante a Regeneração...*, op. cit., 2002, pp. 5-6.

¹³⁴ Tavares de Almeida, *A Construção...*, op. cit., 1995, pp. 168-169.

¹³⁵ Silveira e Sousa, «A Construção do Aparelho Periférico do Ministério da Fazenda em Portugal (1832-1878)», op. cit., 2005, p. 15 and note n. 40.

¹³⁶ Expression authored by Pierre Grémion, quoted in Almeida, *A Construção do Estado Liberal...*, op. cit., 1995, pp. 168.

¹³⁷ *Relatórios*, «Visitas», Bragança, 1868, p. 2.

Conclusion

*The historian is a man who places facts
in their proper place. It is not as it was;
it is just so.*

Álvaro de Campos¹

Reform policies such as map-making and weights and measures, usually singled out as hallmarks of the Constitutional Monarchy, and so considered by coeval publicists, politicians, and later day historians alike, had their origins in late *Ancien Regime*, when state-led «modernization» inspired by enlightened absolutist precepts was making headway, as shown in Part I. Prior to 1820, both the survey of a large-scale map with the geometric cadastre and the endeavour to introduce in Portugal a metric-like system were, more than merely debated to and fro, actually decided upon. The Topographic Map backed up by geodetic networks started to be surveyed in 1788, and was ephemerally coupled with the geometric cadastre in 1801. The metric system, though with Portuguese nomenclature, was taken up in 1814. In the latter case, it was the Liberal Revolution that prevented the protractedly debated reform from coming to pass. From this viewpoint, both chapters tell a similar story: Liberalism took up where Absolutism had left, retrieving similar notions, and, to an extent, debating within similar lines and options. Implementation and enforcement were, however, utterly different.

Map-making acquired a decisive boost after the end of the civil war, and especially from the mid-1840's, when it was formally coupled with the geometric cadastre. By 1848, the Geodetic Board, although increasing in size, personnel and monies, remained a «tiny» map-making unit, hardly able to survey the first-order network, not to speak of the topographic map which would require field topographers

by the hundreds, paid with regular and adequate monies, over a long period of time. The gap between its institutional profile and its job – to survey a topographic map with the cadastre «underneath» – was huge. By the mid-century, the Board was dragging its feet, waiting for the political decision to carry through with the cadastre, which never came.

As for weights and measures, from as early as 1812, a number of parliamentary and outside expert committees were set up to debate the issue and come up with a reform proposal or bill. As we have seen in Chapter II, the parameters of discussion in the 1840's were not very different from those prior to the 1820 Revolution. There were, of course, adaptations and limitations. The period after 1834, and up to 1851, was one of much debate and little implementation. In the wake of the civil war, the state was hardly more than incipient. Small, understaffed, broke, concentrated in Lisbon, and yet to be further divided into important ministries, the state apparatus remained a remote and intermittent feature in the daily lives of the citizenry. Its capabilities and resources, in reality very limited no matter how strident the parliamentary rumbling, grew throughout the 1840's (as exemplified in chapters I and V). Portuguese politicians, unlike their French revolutionary counterparts, perceived a limitation in the range of available policy reform options. They, unlike the French, did not perceive the social landscape in terms of *tabula rasa*, nor themselves as revolutionaries. They felt their hands tied by the respect due tradition and custom, and this showed in parliamentary debates (with few, but notable exceptions). Moreover, after the *Maria da Fonte* rebellion and ensuing *Patuleia* civil war in 1846-1847, the need to avoid the «agitation of peoples» took on paramount importance, thus explaining conservative stances towards metric reform. But not only: all those measures deemed likely to elicit resistances, such as proportional apportioning of taxes, geometric cadastre, and the creation of a new and more equitable direct property tax, were, for the moment,

bracketed. The defeat everywhere in Europe of the 1848 «Peoples' Spring» provided the government with a little more room to manoeuvre, insofar as it was less anxious that its actions would stir up the «revolutionary hydra». This may help explain the leeway enjoyed by Fontes Pereira de Melo in 1852, and by the «Regeneration» regime legislator in general, while decreeing the metric system complete with the heretofore dreaded Greek-Latin names.

The fact that the country remained poor, illiterate, monocephalic, peripheral, rural and indebted notwithstanding, the regime subsequent to the April 1851 coup inaugurated an epoch of stability and underlying political consensus in which policies with a territorial impact, and which presupposed a territorialized structure, were carried out by an ever-expanding administration. It was, to make it plain, when the rubber met the road. The documented resistances these policies faced are a sure indication that the infrastructural power of the state was, *ipso facto*, increasing. The question to ask is not so much «if so» but «how so».

Ever since Ávila's cadastre European tour of 1847, the government took steps to promote the survey of geometric cadastre in association with the Topographic Map. A subordinate relation between map-making and cadastre, i. e., between geographic information and taxation, was forged. When the idea of the cadastre was dismissed in 1852, the weakest pole of the relation, the Map, was suddenly emptied of content, for it would be irrational to survey a large-scale map with no cadastre «underneath». A new association was needed. The development of communication infrastructures, after 1851, provided such an anchor, a programme which the *Carta Chorographica* came to embody. The fact that the Chorographic Map resulted from a compromise between comprehensiveness of scale, accuracy and survey velocity was rife with consequences. On the one hand, it had enabling properties: it assigned the Board a feasible aim, gave the

institution monies, personnel and instruments, provided the government with a first modern, accurate and transportable picture of the realm, a valuable tool of government. On the other hand, it begot constraints: the map was helpless both at project and higher scales (it was useless to plan a port, an urban sewer system or depict the border with Spain) and at smaller scales (say, the management of river basins or the representation of geological survey). Different maps were needed to those aims, but not every map politicians, bureaucrats and engineers desired could be surveyed at once, for budgetary and technical reasons. Choices had to be – and were – made.

An interesting issue was left in the wake of Chapters I and III. All through the «Regeneration», and up until 1910, the idea of the geometric cadastre never resurfaced. How was it that a measure deemed to be so equity-promoting continued not to be adopted when the conditions governing its necessity remained powerful? To wit: if one assumes that infrastructural power grew throughout, one has to assume that the ability to enforce policies would follow; the unbalance of fiscal revenues towards indirect taxes hallmarked the period; a high level of inaccuracy and fraud in the 1852 land registries, as in those that followed in 1860 and 1870, stirred both public opinion and members of parliament.² This can be explained at three different levels: (i) cartographic: as it developed, the 1852 programme revealed path-dependence features which ruled out the introduction of large-scale surveys such as the parcelled cadastre until the *Carta Chorographica* was completed; (ii) budgetary: the cadastral survey was an extremely expensive enterprise in a context of a permanent and ever-growing budgetary deficit.³ Burgeoning public debt led to the miniaturisation of public expenditure and investment, particularly after 1890, conditioning the birth of new projects⁴; (iii) societal: the power equilibriums within the ruling elite continued to weight heavily. The political parties which rotated in government were cut across by class interests, such as those arising

from land ownership. Only the Republican Party, whose supporters came mainly from urban middle classes, escaped such deep-rooted interests.⁵ This is perhaps why the geometric cadastre was presented right away in the republican Constituent Assembly in 1911, and finally adopted in 1924.⁶ Upon examination, the 1852 dismissal and subsequent reiterated non-espousal of the cadastre corroborates the government's difficulties in enforcing a policy that would injure the interests of landed aristocracy and upwardly moving bourgeoisie. This was an instance of a more general difficulty in penetrating the territory and by-passing «external» influences, local or otherwise. Elites simply did not want to pay more taxes; not even to redress the unbalance in fiscal equity.

As interpretative aid, the Spanish case is particularly in point. Spanish «progressive» governments also looked at cadastre as the best means to combat the inaccuracies of the *amillaramiento* system, created by the «moderate» Murillo in 1850. In his fundamental work on the history of Spanish cadastre, Juan Pro Ruiz explains why: manipulation, injustice, and property occultation: «In 1850, the moderates introduced a new statistical system, destined to endure: we speak of the *amillaramientos*, which supposed the definitive resignation from having reliable information from the State Administration or planimetric surveys that would allow for the control of the data's veracity. In their place, one would keep the basic mechanism in which taxpayers would themselves volunteer the data on their wealth, leaving the control of the operation in its entirety in the hands of the municipalities. If the wealth 'padrones' had been poor, the *amillaramientos* took tolerance of fiscal fraud to an historic high. In the first *amillaramiento* of 1850, around 40% of the surface heretofore known 'disappeared'». ⁷ Probably, one could say of the Portuguese case what Nadal and Urteaga have said of the Spanish dismissal of the cadastre, in 1870: «[the geometric

cadastre], which envisioned particularly territorial wealth, collided head-on with the interests of the majority of the bourgeoisie. Hence, the carrying out of parcelled cadastre, which constituted a cornerstone of that global project and to which the Topographic Map was extremely important, begot all sorts of opposition and fear from large proprietors, both urban and rural. They saw in that project a state strategy to inspect and disproportionately excise their assets».⁸

In 1859, 1860, 1861 and 1862 lay people resisted using the metric system. Perhaps they rioted against the metre in the same way they destroyed geodetic pyramids, attacked engineers in fieldwork and burned down land registries in town halls. In order to become «accepted», the metric underwent a dual sociological transformation, the «double naturalization of the metre». On the one hand, it went from «Nature» to «Society». The new system was not presented to the general public as an arbitrary artefact, the outcome of human agency. Rather, it was held up as something taken directly from Nature, a bit of Nature as it were, wherefrom it gained symbolic legitimacy in contrast to alternative metrologies. The metre thus became socialized as something «natural», «universal», and «enlightened», as opposed to earlier metrologies, depicted as «social», «particular», and «traditional». On the other hand, the metre went from paper to practice, that is, from having an existence external to humans to becoming an element of everyone's «*habitus*», an ingrained practical knowledge, as it were, a «second nature». In time, the metric system ceased to be an exotic, quasi-alien set of theoretical contraptions to become part and parcel of people's everyday life. In time, the metre would become customary, trivial, and natural.

Chapter IV deals with said naturalization of the metre, focusing on the «epic phase» between 1852 and 1862, when both the metre and the kilo were enforced. During that period, the Department of Weights and Measures pursued four main lines of

action. First, inspectors were sent to municipalities around the country in order to gauge old standards and compare them to the metric ones. Their reports portray a metrological chaos and help expose in the eyes of public opinion the system they were sent out to replace. Inspectors were also sent to teach elementary teachers and priests the basics of the system, so they would spread the metric «gospel», helping to turn this most alien contraption into something understandable, familiar even. Additionally, the Department published compendiums of weights and measures, tiny books explaining the system to anyone willing to spend a few *escudos*, and strove to enrol the help of priests. Upon reporting back, inspectors underlined the importance of school and pulpit in the machinery of diffusion while being extremely critical of schoolteachers and priests. Inspectors were again sent to the field to follow-up, ease through, and report back on the implementation of both metre and kilogram.

More than told, or compelled by penal articles of the law, people had to be convinced of the metre's marvels. Top officials were acutely aware of this, and accordingly designed a strategy, which shifted from a philosophy of enforcement based on the ability to enrol a set of heterogeneous actors, inherently based on a negotiated and intermediate relationship, to one based on a more direct and coercive relation, departing from the assessment of compliance with decreed norms to unambiguously punish disobedience, resorting to disciplinary charges and penal sanctions, if need be. These were not zero-sum approaches, but stages in a continuous spectrum unfolding over time. As time passed, however, the reform wallowed in the mire. The Department found that municipalities and the Interior were «guilty» of fraud, or, at least, lack of zeal, to say nothing of sloppiness. Contrariwise, the Interior concluded that the blame was on recalcitrant commoners and that little could be done without stirring people's «excitement». To risk the latter was, of course, impolitic, as the prime-minister Loulé

candidly told Fradesso, in 1862. A tone of resignation came upon the reform and the reformers in the years to follow. The litre was enforced only in 1872, the fifth date in a string of postponements and ten years after the original deadline. More than being right, Loulé was being shrewd: either the system would be established by «persuasive methods» or none at all; more than anything, it would not be so by force. And, if it eventually came to be established – the «when» is uncertain – it certainly was not by the power of might.

The «general population census» perfectly captures the essence of historical state modernization. Because it epitomizes it, it puts it to the test. What did it mean to carry out a «modern census»? It meant, on the one hand, a set of technical features, such as simultaneity, generality, periodicity and official nature. On the other, it meant a break with the administrative tradition of annual «censuses» carried out by the Interior peripheral administration, entirely faulty and mired in the corrupting influence of local communities. In this sense, the 1864 census was designed to be the «first modern census». Though it used the network of prefects, municipal administrators and parish commissars, whose very incompetence and guile justified its execution in the first place, an independent structure was created to oversee the action of thousands of enumerators. Thus, formally, the census sought to escape the deleterious influence of clientele networks and the parochial control of base data. Parish priests, the keepers of parochial registries and targets of both patronage and harsh criticism, were notoriously removed from the whole affair. To count the population, an apparently tedious and boring matter, was actually at the centre of fierce social dynamics, in which parish priests, municipal administrators, parish commissars, municipal bodies, and prefects were all entangled. This was so because population data was used in the military recruitment everybody sought to dodge, to apportion taxes everybody sought to evade, and to fabricate the

electoral registration which everyone, the government of the day most of all, sought to control.

The 1864 census was both a success and a failure. It was a success insofar as it yielded results unanimously considered to be by far superior to those of the Interior annual censuses. However, this may be more of a comment on the poor quality of the latter than praise of the former. The estimated budget was kept and the simultaneous overnight action of 8 352 enumerators in the field was an impressive display of coordination and logistical capacity. The problems arose with the sorting of the data. It not only took too long to do – 15 months –, but yielded only, and contrary to expectations, gender, marital status and age, and not occupation, nor education. The execution of the 1864 census was faced with the very hardships that plagued annual censuses. The same lack of schooling in the population and the staff, the same incompetence, lack of commitment, poor territorial division and abhorrence by the population, all frustrated the execution of the census. Something which, one must say, is not surprising.

All three chapters in Part II, but especially those on weights and measures and the census, show the importance of a negotiated viewpoint on the exercise of state power, thereby confirming the views – which I herein make my own – of Pedro Tavares de Almeida and Luis Espinha da Silveira. From this perspective, the framing and control of peripheries by the central power via the peripheral administration results from a permanent negotiation between the actors involved, to wit: the peripheral administration and its social power competitors, the Church and affluent, noble, landed, notable classes. Let me stress that the line of demarcation between State and Society was drawn within the state, notably inside the peripheral administration, as the offices of prefect, and especially municipal administrator, demonstrate with little doubt.

The case of map-making showed how the state's contradictory needs for maps at different scales (corresponding to different usages, therefore to various private interests and agendas), in the end, hurt the quality of first-order triangulation, requiring extensive revision when it was necessary to hook up with the Spanish and European networks. The case of weights and measures evinced the difficulty in aligning the wills or interests of all the actors in localities and the importance of inspectors' agency in obtaining that effect. It also showed the importance of the production of acceptance through, namely, the elementary school and the pulpit, which helped naturalize the metric system in the dispositions of the population. The complicated history of deadline-setting and deferment of the litre showed how hard it was to «simply» enforce the law. Officials' agency in the field duly reflected these hardships, ranging from negotiation to straightforward application of the law. The case of the census is perhaps the most enlightening on the mechanisms of co-operation/competition with the Church and, local communities-wise, one of the best examples of said «contractualization». The 1864 census, designed to be the «first modern» one, was a sobering experiment. Ironically, «modernity» did not serve the census well. Its publication showed that it was its own «modernity» (in not using the parochial network, nor the priests) that made for such faulty results. In 1878, in the next, tardy, census, the Church and priests were again called upon to help.

What all these instances of Portuguese nineteenth century statecraft have in common is that they are Janus-faced: a state power at once strong and fragile, powerful and yet likely to crumble. No power is all-powerful and state power is no exception. Whether Prussian, French or Portuguese, research has shown nineteenth century state power was imminently resistible. Let us take the official map as example. The map is the uncontroversial epitome of strength. Give the ruler a map-room and he will rule the

country. In fact, well into the last throes of the century, the map-room was the grandest laboratory in the world. However, we have seen how engineers in action work inside narrow and delicate networks, within which they make little bits of information travel rapidly, increasing their mobility, reliability and interchangeability. The power of the map lies precisely in enabling a point to act at a distance over other points, allowing a centre to master the periphery. This domination, however, is not given, nor settled once and for all, but a frail construction that can be eroded, interrupted or destroyed if the inscriptions are immobilized, mutable, less readable, or less combinable. Whenever the engineer was assaulted or had his instruments destroyed, whenever he was ill, or the annual budget was cut.... Whenever any of these things happened – and they did happen – the powerful links in the chain broke down and the power to act at a distance was lost. The same can be said of weights and measures and the census – and indeed chapters IV and V are vivid illustrations of that.

If the present dissertation can claim to be innovative it is precisely *(i)* by stressing the importance of negotiated enforcement, thus acknowledging the need to look for the micro foundations of macro processes; *(ii)* by viewing state-making and science-making as essentially the same process at a micro scale of analysis, and finally *(iii)* by stressing the fundamental need to work the macro-micro road back to the macro level.

Throughout, I have been espousing the view that little differentiates state-making and science-making at a micro scale of analysis. In brief: they share the same sociology, which, borrowing from Law, I call «heterogeneous engineering». Thus, I took up the notion of looking at statecraft as a technological challenge, at government as the outcome of said technology, and at map-making, weights and measures and census as tools of government. A caveat is in order, though. One must avoid the slippery slope

of resolving «political authority in the technical operation of inscription devices». One should not assume the authority of the relations one seeks to explain. Inscription devices do not pop up in localities like mushrooms, they originate from authoritative sites. Consider the census: population as an artefact of statistical investment depends on authoritative categorizations. Authority is already present in the fieldwork encounter between enumerators and informants. In brief, «censuses are made, not *taken*. They do not simply report aspects of social relations existing in a pristine condition prior to the work of census making. Rather, census making configures social relations in keeping with particular political and cultural objectives and interests in order that such relations may be known and governed».⁹

It proved to be valuable to couple a view focused on institutional building, legal framework and parliamentary debates with a perspective of state formation from below, from the «machinery» and «the field». Indeed, to follow the application of policies in the ground was fruitful, for one, in illuminating the mechanisms of negotiated enforcement and resistance. A close look at fieldwork allowed me to assess the crucial importance of policy brokers and middlemen. A thoughtful description of the «Regeneration» state, or any other nineteenth century state, ought to balance the interpretative elements which stress the qualitative increase in the state's administrative capacities – which is undeniable – with others which qualify that increase and highlight the *mode* of the relation between the centre and the peripheries: contractualization. This kind of relationship, though laden with endemic contradictions (the one with the Church *a propos* the 1864 and 1878 censuses being a particularly good example), provided the centre of political power with an *apport* of efficiency which was not negligible – especially when the centre could not, or would not, pay the political and economic price of establishing an alternative mode, univocal and intermediary-free, more coherent with

the pervasive liberal rhetoric. Chapter V, the sections on popular uprisings in chapter IV, and the sections on assaults and insults in chapter III make this point unmistakably clear.

The functioning of public administration as a whole does not resemble a clockwork mechanism in which the power applied in the winding is frictionlessly transmitted to the whole of the machinery, resulting in the production of a specific, ordered effect. Rather, order is rare and attained at great cost, and problems of order are always, as Steven Shapin recalls, problems of knowledge. That is why it is adequate and useful to speak of governmentality, «structured around cycles of social control linking observation, normalizing judgement and regulation». The key-word here is «observation», which has «two purposes: it not only provides a means of comparing some construction of social reality with a norm; it also helps the governing authorities decide whether there are limits to its ability to enforce or achieve the norm, whether the attempt should be made to correct any perceived deviations.»¹⁰

The working of these cycles ought to be linked with the institutional setting up of the inspectorate, whether of elementary teachers, shopkeepers, or within the geodetic Board proper. In line with Hannah's argument, we have seen how inspective practices, and the peripheral administration in general, materialise the state in the form of a network, regulating upward and downward fluxes of information and power. To see like a state is to be like a state. Let me underline two features of such cycles of accumulation. First, they reproduce the statuses of centre and periphery regions, obtaining a subordinate relation between the latter and the former. This fact warns one against taking these categories for granted and suggests state power be looked at as the *explanandum* rather than the *explanans*. Second, «images of the people» emerged, along with an attending rationale, the «enlightened rescue of the people». Such imagery was

poised between the people as receptacle of government, whose function is chiefly to comply, and the people as, to a certain extent, the new sovereign, whose function, as the ultimate source of political legitimacy, is to decide. People, thus conceived, ought to be rescued from the binding forces of tradition, habit and faith which kept them hostage, preventing them from joining the liberal contract.

Looked at as an ensemble, my research themes show the Portuguese state formation process unfolding, though not in the teleological way both coetaneous political rhetoric and «modernist» literature suggest, but in an almost stumbling manner. Perhaps there is a misunderstanding in the «modernist» historiography and historical sociology of state formation which parallels the one in Jacobin and Marxist historiography of the French Revolution. Maybe one can say of the former what Furet has said of the latter:

«[I]t is the Revolution's actors consciousness that retrospectively organizes the analysis of the causes for their actions. The historian, in order to be faithful to that consciousness, without shirking his duty of explanation, ought solely to explain the event in terms of necessity [...]. [§] If, as a matter of fact, objective causes make necessary, and even fatal, the collective action of men to break up the '*ancien régime*' and set up a new one, then there is no distinction between the issue of the Revolution's origins and the nature of the event itself. For not only is there coincidence between historical necessity and revolutionary action, but transparency between this action and the overall meaning given to it by its actors: to break with the past, to found a new history. [§] The tenet of the necessity of 'what happened' is a classic retrospective illusion of historical consciousness: the past is a field of possibilities within which 'what happened' comes up too late as the single future of that past».¹¹

Such misinterpretation consists in taking at face value what historical actors have said about themselves: both what modern, liberal statesmen said of themselves and of what they were doing (modernist version of state modernization), and what revolutionaries

have said of themselves, their actions and of what the Revolution was (revolutionary version of the Revolution). Not only historical actors; also historians who took little distance from this retrospective illusion: Gershenkon, Michelet, Comte, Spencer, Spengler, and so on. Tocqueville, and partially Marx and Weber, not included. This circuit was reinforced by a reflexive bias: nineteenth century actors started moulding their actions, scripting and retrospectively explaining them, by exploring the interpretations which sociological (sociology being of course the ambitious new science of the modern, industrial world) and historical discourses (both shot through with scientism) were turning out about what those actors were doing and where society was going. Statesmen became modernizers in themselves and to themselves.

Interpretation blunders are bound to follow: the notion of historical blocks succeeding one another in a clear-cut manner; to read the permanence of «what was before» and «old ways» as aberrations to discredit and suppress; the teleological and «improving» vision of history, in which any move towards the anticipated final stage is welcomed as «progress» and any other seen as a «setback»; the unwarranted expectation of finding ideal-types let loose in empirical reality and the attending disappointment when this is not so; the rigid interpretation of resistances as archaisms and sure signs of endemic backwardness. One must recognise that such equivocation originates in the historian's approach to empirical landscape, and that, therefore, the issue harks back to theoretical categories of understanding, and subsequently to research *démarches* and design. However circuitous, this dissertation's design (to sum up: macro-micro and back), was conceived to skirt that trap.

Notes

¹ «O historiador é um homem que põe os factos nos seus devidos lugares. Não é como foi; é assim mesmo». Fernando Pessoa, *Aforismos e afins*, org. and pref. Richard Zenith, Lisbon, Assírio & Alvim, 2003, p. 41 (all translations are my own).

² Maria Eugénia Mata, *As Finanças Públicas Portuguesas da Regeneração à Primeira Guerra Mundial*, Lisbon, Banco de Portugal, 1993, p. 171. See J. H. Fradesso da Silveira, *Os Arrolamentos. Discursos proferidos na Camara dos Senhores Deputados da Nação Portuguesa [...] nas sessões de 25 e 26 de Abril de 1870*, Lisbon, Imprensa Nacional, 1870.

³ Pedro Lains, «Os impasses do desenvolvimento» in António Reis, dir., *Portugal Contemporâneo*, vol. 2, Lisbon, Publicações Alfa, 1990, pp. 13-100; António Silva, «Finanças Públicas 1807-1890» in José Mattoso, ed., *História de Portugal*, vol. V, Lisbon, Estampa, 1993, pp. 381-391,

⁴ Rui Ramos, «A crise», in António Reis, dir., *Portugal Contemporâneo*, vol. 2, Lisbon, Publicações Alfa, 1990, pp. 165-182, here pp. 166-178.

⁵ Fernando Catroga, *O republicanismo em Portugal. Da formação ao 5 de Outubro de 1910*, Lisbon, Editorial Notícias, 2000, pp. 63-73.

⁶ Anni Günther and Rui Tavares, «A representação gráfica rigorosa como instrumento, técnica e linguagem da gestão espacial: a institucionalização do cadastro topográfico parcelar» in AA.VV., *Estudos de Arte e História: homenagem a Artur Nobre de Gusmão*, Lisbon, Veja, 1995, pp. 329-333.

⁷ Juan Pro Ruiz, *Estado, geometria y propiedad. Las origines del catastro en España, 1715-1941*, Madrid, Ministerio de Economía y Hacienda, 1992, quote p.83.

⁸ Francesc Nadal and Luis Urteaga, «Cartografía y Estado: los mapas topograficos nacionales y las estadística territorial en el siglo XIX», *Geo Critica*, nº 88, July, 1990, pp. 7-64, quote p. 58.

⁹ Bruce Curtis, *The Politics of Population. State Formation, Statistics, and the Census of Canada, 1840-1875*, Toronto/Buffalo/London, University of Toronto Press, 2001, pp. 33-35.

¹⁰ Matthew G. Hannah, *Governmentality and the mastery of territory in nineteenth century America*, Cambridge/New York, Cambridge University Press, 2000, p. 25.

¹¹ François Furet, *Pensar a Revolução Francesa*, Lisbon, Edições 70, 1983 [1978], quote p. 37.

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Annex

Historical Timeline

	PORTUGAL	EUROPE
1706	João V becomes king	
1750	José I of Portugal becomes king	
1755	November, 1. Lisbon earthquake destroys the city to the ground	Lisbon earthquake impacts dearly on European philosophical thinking
1759	January, 13. All members of the Távora family are executed for high-treason and attempted regicide, by order of the Marquis of Pombal	
1777	Maria I of Portugal becomes queen; Prince consort is her uncle, Pedro III of Portugal	
1788	Decision to begin the geodetic survey of the realm, as basis for a future General Map of the Kingdom, a large-scale topographic Map.	
1790	Reform bill redrawing judicial constituencies	
1798	Creation of the Royal Maritime Society	
1801		Britain makes Ireland part of a single British kingdom. Parliament in Dublin is abolished; the Anglican Church is to be recognized as the official church in Ireland. Napoleon of France has defeated Austria. In the treaty of Lunéville, Austria renounces claims to the Holy Roman Empire
1804		Napoleon crowns himself «Emperor of the French» Spain joins Napoleon's war as an ally against the British
1805		Russia, Sweden and Austria ally themselves with Britain Napoleon is crowned «King of Italy», in Milan A French fleet sails north to Spain's Atlantic port of Cadiz. Napoleon orders his French and Spanish ships out of

		Cadiz to do battle with the British. The British win, at the Battle of Trafalgar, frustrating Napoleon's invasion plan
1806		The Emperor of Austria, Francis I, abdicates his other title: Holy Roman Emperor. The Holy Roman Empire, created in the 800s, is formally dissolved, with Napoleon reorganizing much of it into his Confederation of the Rhine.
1807	Napoleon Bonaparte invades Portugal and the Portuguese Royal Family is transferred to the colony of Brazil which is elevated to the status of kingdom and centre of the Portuguese Empire. Beginning of the Peninsular Wars. First of three French Invasions (1807-08; 1809, and 1810-11)	Napoleon moves to consolidate his position in Europe. He defeats a combined Prussian and Russian force in February. He defeats the Russians in June and occupies Königsberg. Alexander of Russia is annoyed with the British and agrees to meet with Napoleon. August, Napoleon demands that Portugal join the trade boycott against the British and declare war on Britain. Napoleon's ally, Spain, allows French troops to pass through its territory to Portugal.
1808	Insurrection against Napoleon's general Junot and landing of Arthur Wellesley (later Duke of Wellington) to defeat the French at the Battle of Vimeiro.	Napoleon intervenes in a quarrel between Spain's king, Charles IV, and the son of Charles, Ferdinand. He makes the two of them prisoners in a comfortable setting and moves his brother Joseph from the Kingdom of Naples to the throne in Spain. Spaniards resent the presence of French troops and Napoleon's interventions. An unusually barbarous war begins within Spain. Resistance to the French spreads to Portugal. The British land a force there to help the resistance. It is the beginning of Napoleon's decline.
1809		Napoleon is spread thin. The Austrians defeat him at the Battle of Aspern-Essling, and he loses his reputation for invincibility. The Austrians fail to follow up on their victory. Napoleon organizes an assault and defeats the Austrians. The Austrians make peace with Napoleon. Napoleon's economic blockade is not working. Britain's exports reach an all-time high.
1810		Allied with the Portuguese against Napoleon, the British negotiate an agreement with the Portuguese calling for the gradual abolition of the slave trade across the South Atlantic.
1811	The French are driven out of Portugal thanks to British support, which came at	

	the cost of British tutelage until 1820, and was facilitated by the royal family's fear of returning to Europe.	
1812		At sea, Britain has a counter-blockade against France. Britain's new prime minister, Lord Liverpool, instructs the British navy to treat U.S. trading ships with new tact and to avoid clashes with Americans. This does not deter those in the U.S. who want war, and Congress declares war against Britain on June 18, 1812.
1813		In Spain, British and Spanish forces defeat Napoleon's military. Napoleon withdraws from Germany after the Russians, Prussians, Austrians and Swedes defeat him there.
1814		A negotiated treaty ends the War of 1812-14 and restores «peace, friendship, and good understanding» between the United States and «His Britannic Majesty». Russian and Prussian forces enter Paris. Napoleon is exiled to the island of Elba. The terms of peace between the victors and France are settled in another Treaty of Paris. The victors gather at Vienna (the Congress of Vienna) to create a stable Europe to their liking.
1816	João VI of Portugal becomes king. Portugal is governed by a Regency council headed by Marshal Beresford, head of the Portuguese army in the Peninsular War.	
1820	Liberal Revolution. Insurrection against the British-led Regency. A liberal parliamentary Constitution is adopted. Metropolitan Portugal demands the return of João VI to Lisbon. João VI advises his son, Pedro, to declare the independence of Brazil and become its emperor, to ensure its continued rule by the Bragança dynasty. João VI accepts the constitution of 1820 but his wife Queen Carlota and younger son Dom Miguel refuse to do so and become the focus of a reactionary movement. The Revolution was the dawn of <i>Vintismo</i> (1820-23)	A liberal uprising begins in Spain, beginning with soldiers, is joined by others who want a constitutional monarchy, or a republic. A few who are poor and illiterate attack and set fire to churches.
1821	The Constituent Congress, elected by universal male suffrage, adopts a constitution (ratified 1822), inspired by the recent liberal advances in Spain, notably the 1812 Constitution of Cadiz.	The stability for Europe sought at the Congress of Vienna in 1815 is coming undone. Following Serb rebellions against Ottoman rule in previous years, the Greeks rise against Ottoman rule,

		including in Macedonia, Crete and Cyprus. The Turks respond by hanging the Patriarch of Constantinople, Gregorios V. The Greeks liberate the Peloponnesian Peninsula in September. Napoleon Bonaparte dies at the age of fifty-one under British authority on the island of St. Helena.
1822	Brazil declares independence. Pedro becomes Pedro I of Brazil.	
1823	May/June. <i>Vilafrancada</i> : Military coup against the parliamentarians inspired by reactionary elements loyal to the old absolutist order. Fearing a move by France against democratic Portugal, or a civil war, Brigadier Saldanha, a grandson of the Marquis of Pombal, raises a small army and expels the «constitutional extremists» from Lisbon. He proposes instead a compromise constitution in which the powers of the crown will be partially restored to the King.	Austria, Russia and Prussia authorize French troops to enter Spain to destroy the liberal revolution there and re-establish the rule of Ferdinand VII. Ferdinand begins revenge killings that will revolt those who returned him to power.
1825		Louis XVIII died and is succeeded by his reactionary brother, Charles X.
1826	Death of João VI. The country is split between radicals and absolutists. Emperor Pedro I of Brazil becomes king Pedro IV of Portugal but abdicates in favour of his daughter Maria II of Portugal, naming his brother Dom Miguel as Regent provided he swears to accept a new constitution, drawn up by Pedro and somewhat less liberal than that of 1820, based upon the Brazilian constitution. Pedro's constitution (the Charter of 1826) assigns authority to the crown to moderate between the legislative, executive and judicial powers of the state and proposes a House of Lords of 72 aristocrats and 19 bishops. Miguel makes a show of agreement.	
1827		Britain, Russia, France break with Austria regarding the Greek war of independence - Austria still feeling threatened by any revolt against empire while the Russians want to protect their fellow Orthodox Christians. Egypt, a part of the Ottoman Empire, is helping the Turks, but a combined British, French and Russian fleet sink an Egyptian and Turkish fleet at Navarino Bay, on the west coast of the Peloponnesian Peninsula. This weakens

		Ottoman power in Greece and in Arabia.
1828	Dom Miguel usurps the throne and abolishes parliament and the constitution, re-instituting the mediaeval <i>Cortes</i> and claiming to be 'Absolute King'. Many of the liberal parliamentarians are imprisoned, executed or driven into exile. All Portuguese territories apart from Brazil and Terceira in the Azores declare for Miguel, but he is recognized as King only by Mexico and the USA. The <i>Miguelista</i> experience would last until 1832, and was ended by defeat in a civil war.	
1829		The Treaty of Adrianople ends war between Russia and the Ottoman Empire. The Ottoman Empire grants Greece independence. Russian authority in Georgia is recognized. The Russians are allowed access through the narrow straits from the Black Sea to the Aegean Sea. Autonomy is extended to Serbia and to the Romanians of Moldavia and Walachia, under Russian protection.
		Businessmen and common people loath Charles X, who has returned to absolutism, including dissolving parliament. The barricades go up in the streets of Paris. Charles X is frightened and rather than fight goes into exile, back to Britain. Parliament returns, creates a constitutional monarchy and elects a new king, Louis-Philippe. Violence erupts across Germany. Rent, tax and military records are burned. People want bread or are annoyed by higher prices for food, military conscription and in places by feudal dues. In Brunswick, Grand Duke Karl flees and a liberal constitution is created. The king of Saxony grants his subjects a liberal constitution. In Hesse-Kassel a constitution and a unicameral legislature are created.
1831	Emperor Pedro I of Brazil abdicates in favour of his son Pedro II of Brazil and sets out to recapture Portugal for his daughter.	Various uprisings are taking place on the Italian peninsula, including the papal states. Pope Gregory XVI is opposed to democracy at any level and calls for help from Austria. Austria's army marches across the peninsula, crushing revolts and revolutionary movements.

		In Warsaw, Polish soldiers revolt against Russian rule. Austria and Prussia want the revolt crushed. Freedom for the Poles is a popular cause in Britain and in France, but little help arrives and Nicholas I, who considers himself both the Tsar of Russia and King of Poland, sends troops to overwhelm the rebellion.
1832	Civil War (will last until 1834). Pedro's expeditionary force of exiles and foreign mercenaries gathers in Terceira, recaptures the Azores, then sails for Portugal. Pedro is supported by Britain and France and the Portuguese intelligentsia, including the politically-ambitious soldiers Saldanha and Sá de Bandeira. 9 July: Pedro lands at Porto, where he is closely besieged by some 13,000 Miguelites across the River Douro. His defending force, the city garrison being commanded by Sá de Bandeira, includes an international brigade with a British contingent under Charles Shaw.	The Whigs acquire more power momentarily. They are largely aristocrats with liberal leanings. They want to make Britain's political system fairer and to placate working people without giving in to all their demands. The Great Reform Act, denied in 1831, is passed into law.
1833/1834	D. Miguel's navy is defeated by Pedro's Admiral Charles Napier at the third Battle of Cape St Vincent. The Duke of Terceira defeats Miguel's army at Almada and occupies Lisbon. The Dukes of Terceira and Saldanha win the battle of Asseiceira - end of the civil war: Miguel I exiled to Germany. After two years of bitter and destructive war the country is once again bankrupt and beholden to foreign creditors, and the constitutional radicals turn their anger against the landowners and ecclesiastical institutions that had supported Miguel. The crown lands (a quarter of the national territory) are taken over by the state to help pay the national debt. Death of Dom Pedro (1834). Maria II of Portugal becomes queen. Dissolution of the monasteries (over 300 monastic orders are abolished).	Britain's Abolition Slavery Act goes into effect, with the British government prepared to compensate financially those who lose slaves. In Canada many slaves had been freed years before. The remaining 781,000 slaves are freed, but no claims for compensation are submitted.
1835		Britain and Spain renew agreement against the slave trade. British sea captains are authorized to arrest suspected Spanish slavers and bring them before mixed commissions established at Sierra Leone and Havana.
1836	September Revolution. Revolutionary	Britain has been emancipating slaves in

	fervour is rekindled by an urban uprising and a military coup d'état. The national Guard sides with the insurgents and approves the call for Sá da Bandeira to lead the nation and bring back the constitution of 1822. Queen Maria is forced to swear allegiance to the 1822 constitution but the moderate leader, Saldanha, reaches an accommodation with Sá da Bandeira and a modest programme of modernisation can begin.	its Cape Colony. Boers in the colony dislike it. From 10,000 to 14,000 Boers begin their Great Trek away from British rule and for new African lands to occupy.
1838	The <i>Setembrismo</i> regime resulting from the 1836 revolution approved the short-lived 1838 Constitution, which fell halfway between the two previous texts.	
1842	<i>Order</i> was restored in the beginning of the year, with royal approval, by António Bernardo da Costa Cabral, a one-time radical, fallen for the delights of French doctrinaire politics. Restoration of the 1826 Charter; holding of elections which provided Costa Cabral with a disciplined majority, allowing him to rule with such firmness as to be accused of tyranny.	
1843	Queen Maria II marries Prince Ferdinand of Saxe-Coburg-Gotha, who rules with her as Dom Fernando II, the thirtieth King of Portugal. He commissions the German architect Baron Eschwege to begin the building of the Pena Palace at Sintra.	
1844	<i>Pronunciamento</i> of Torres Novas/Almeida, which had intended to return <i>Setembrismo</i> to power, was easily crushed by the government	
1846	Spring. <i>Maria da Fonte</i> rebellion, or popular revolt. The government of Costa Cabral was forced to resign due to lack of support within the regime Autumn. Civil War, the «Patuleia». A revolutionary government is proclaimed in Oporto with Sá da Bandeira at its head. He opens negotiations with Britain, whence Costa Cabral has fled into exile, and settles terms for his return to take responsibility for the national debt. Civil war between the supporters of Queen Maria and the radical constitutionalists. The Conde do Bonfim, for the Oporto junta, is defeated by Saldanha at the siege of Torres Vedras and exiled to Angola.	Poles in Krakow revolt against Russian rule. Austrian and Russian troops enter Krakow and Austria annexes the city. Pope Gregory dies and is replaced by Pius IX.
1847	June. Convention of Gramido brings the civil war to an end.	

1848		<p>In Milan in January, sixty-one people are killed protesting against a rise in taxes by Austria's authorities. In January in Palermo, Sicily, people riot. In February in Paris people go to the barricades. The monarchy quits and the Second Republic is born. Revolution in Paris inspires uprisings in Germany and Austria. And Hungarians and Romanians demand independence.</p> <p>Revolutionaries in Paris, upset by elections that did not go in their favor, stage another uprising, and they are crushed. The middle class in Germany joins the aristocracy against disorder, and revolution there is crushed. The political left in Vienna has alienated the liberal center and reaction there replaces revolution. Austria crushes Czech and Italian nationalism. With help from Russia, Austria crushes Hungarian resistance to its rule. Switzerland's civil war ends. Federalism and unity win against the separatism wanted by the Catholic Church and Austria.</p>
1849	Costa Cabral returns as prime minister, replacing Saldanha.	
1851	Another <i>coup d'état</i> led by Saldanha, called «Regeneração» (regeneration). He ejects Costa Cabral, appoints himself prime minister and rules reasonably progressively from the house of lords for a full five-year term. Thus a proper parliamentary regime is finally established, with a two-party system and a liberal monarchy. The government embarks on an elaborate programme of public works to modernize the country directed by Minister Fontes Pereira de Melo. Cabral went into exile in Spain for the second time in five years.	
1852		Louis Napoleon (Bonaparte's nephew), President of France's Second Republic, has consolidated conservative support and dissolves parliament. He crushes an uprising, establishes a dictatorship and holds a plebiscite to justify his move. Peasants and the religiously devout give him the votes he wants.
1853	Pedro V of Portugal becomes king	Louis Napoleon is declared Emperor Napoleon III. He would like to create a dynasty. France is no longer a republic. It is called the Second Empire.

		Tsar Nicholas I of Russia goes to war against the Ottoman Turks over what he sees as his right to defend Orthodox Christians in Turkey and in Jerusalem (then under the authority of the Ottoman Empire).
1854		Imperial Britain and France are afraid of Russian expansion. In response to a Russian victory at a Turkish port on the Black Sea they declare war on Russia. The Crimean War begins. Queen Victoria writes of "the great sinfulness" of Russia as having "brought about this War." Pope Pius IX proclaims the infallible doctrine of the Immaculate Conception of Jesus Christ, that Jesus was born exempt from all stain of original sin.
1856	King Pedro V, displeased with the governing style of Fontes and his growing unpopularity, charged the Marquis of Loulé with the formation of a new cabinet.	Tsar Nicholas I of Russia dies. His son, Alexander II, makes peace with Britain and France, The Crimean War ends. Russia's humiliation inspires Alexander's desire for reform.
1856-1868	These years were marked by continuous political disorder and successive changes of government. « <i>Históricos</i> » and Regenerationists, that is, centre-left and centre-right, rotated in power, whether alone or in coalition. They did not differ in their preference for material progress and extensive public works at the expense of the State's finances.	
1861	Luis I of Portugal becomes king.	Tsar Alexander II issues his proclamation emancipating Russia's serfs.
1862		In Prussia, the largest of the German states, a member of the landed aristocracy, Otto von Bismarck, becomes minister-president. Representing the king, he declares that his government is to rule without parliament
1868	End of this coalition against radicalism	
1869		The Suez Canal opens. It is largely French owned but eager for international business. Access is promised ships from all nations, for a fee. The canal is to reduce travel time between Europe and Asia. Giuseppe Verdi has written an opera for the opening celebration - Aida.
1870	Coup d'État by Saldanha, called « <i>Saldanhada</i> », imposing a supra-partidary dictatorship aimed at allowing	Bismarck believes that war will arouse nationalist fervor and serve to unite the independent German states with

	<p>radical ideas to enter the political mainstream at a moment when the republican threat was becoming increasingly evident, and meaning. This bid failed.</p> <p>Creation of the Reformist Party, resulting from the desire of part of the «<i>Históricos</i>» to become an un-fettered left-wing force.</p>	<p>Prussia. France opposes such unity. Bismarck wants a showdown with France and tricks the French into starting war. The Franco-Prussian War begins in July. In September the Prussians defeat the French decisively at Sedan and capture the French emperor, Napoleon III. The emperor is deposed. France's Second Empire ends and Third Republic begins.</p> <p>In Britain, France, Germany, Austria and in Scandinavian countries, trade relative to population size has increased four to five times what it was in 1830. In Belgium and the Netherlands the increase is about three times.</p>
1871-1877	<p>Long Fontes Pereira de Melo government (centre-right), by now the clear leader of the Regenerationist Party</p>	<p>1871. The war between Prussia and France officially ends with the Treaty of Frankfurt. Bismarck's success has enhanced respect among Germans for his authoritarianism as opposed to the liberalism of his critics. Bavaria agrees to unify with Prussia. France cedes to Germany Alsace and Lorraine, and it is not popular among the people there. French forces crush the Paris Commune, and as many as 30,000 "Communards" and innocent Parisians are summarily executed.</p>
1876	<p>Creation of the Progressive Party, led by Anselmo José Brancaamp, resulting from the fusion between the «<i>Históricos</i>» and the more radical Reformists, worked out in the Granja Pact.</p> <p>Creation of the Republican Party</p>	<p>Rebellion against Ottoman rule has spread to Bulgaria. A reformist group in Turkey deposes Sultan Abd al-Aziz. Murad V becomes sultan but is declared insane. Abd al-Hamid becomes sultan and he accepts the new constitution.</p> <p>The Russians have conquered all of Uzbekistan and occupy the northern part of Kyrgyzstan.</p>
1878		<p>European powers get together in Berlin to settle problems regarding revolts and war against the Ottoman Empire. They settle matters to some degree in accordance with national determination, recognizing Bulgarian and Romanian independence and giving independence to Montenegro and Serbia, but they also defer to old fashioned empire: the Habsburg monarchy in Vienna is given approval of its takeover in Bosnia and Herzegovina. Vienna's army, carrying symbols of Roman Catholicism is crushing Orthodox Serb resistance.</p>
1880		<p>The conservative British politician,</p>

		Benjamin Disraeli, for the last six years has been in his second run as Britain's Prime Minister. Many are unhappy with his having raised taxes and unhappy about the cost of military operations. Election results are not in his favor and he steps down
1881		Austria-Hungary joins Germany's alliance with Russia, a move encouraged by Bismarck, who hopes that Russia and Austria-Hungary will manage their rivalry in the Balkans.
1884	Important electoral reform, negotiated by Fontes, allowing the defeated party to retain a significant number of seats, thereby isolating the Republicans in the extreme-left, while assuring a peaceful rotation between Brancaamp's party and Fontes'	
1885	Constitutional Reform. Hereditary Peers became a thing of the past, the upper house became packed instead with government appointees- Anselmo José Brancaamp dies.	European powers meet in Berlin and make agreements concerning Africa. They give King Leopold of Belgium control of the Congo. Germany acquires what is today Tanzania as a protectorate. Britain annexes what today is Botswana and approves Germany's position in Southwest Africa and the interior of Cameroon. France is colonizing Central Africa and establishes a little colony on the northern tip of Madagascar.
1886	Fontes Pereira de Melo dies.	Britain and Germany agree on a boundary between German East Africa and Rhodesia. Germany recognized Britain's claim to Zanzibar.
1888		The German Emperor dies. His son, Friederich III, dies of throat cancer after reigning 99 days. Friederich's son, Wilhelm II, son of Queen Victoria's politically liberal daughter, Vicki, becomes emperor.
1889	Carlos I of Portugal becomes king	
1890	January. The British Ultimatum provoked by a colonial dispute over the territory separating Angola from Mozambique, which Portuguese troops had begun to occupy. Portuguese society reacted badly to the government's acceptance of British terms, and a wave of patriotism was the outcome, largely orchestrated by the Republican party, which capitalised on this issue. The ultimatum provoked a crisis of authority in the State, which was simultaneously discredited by its	For the sake of popularity, Wilhelm II does not renew Bismarck's anti-socialist legislation. As Wilhelm desired, Bismarck resigns. Economies in Europe have been in a downturn. British investors sell their U.S. stocks for needed money.

	<p>diplomatic and military weakness, a failed Republican rising in Porto in January of 1891, a financial crisis, and the end of the previous decade's understanding between the dynastic parties. The peaceful rotation of, and the balance of power between, the parties, came to an end. 'New life' in politics was needed. The very existence of the liberal regime hung in the balance.</p>	
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